



USAID
FROM THE AMERICAN PEOPLE



Feasibility Study of the US-Pakistan Knowledge Corridor Scholarship Program



This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Association of Public and Land-grant Universities and do not necessarily reflect the views of USAID or the United States Government.

Acknowledgements

Many people have contributed to the development and undertaking of this feasibility study and report. Our acknowledgement is due to USAID for the financial support that made this feasibility study possible. We wish to thank our Erica Rounsefell and Kevin Roberts, in particular for their guidance and feedback over the course of the grant period and Asima Rehman for her contributions and insights during our mission to Islamabad.

APLU additionally would like to acknowledge the Higher Education Commission of Pakistan, and particularly Prof. Dr. Mahmood Ul Hasan Butt, Consultant to the Higher Education Commission, and Ms. Fareeha Armughan, Senior Project Manager for the US-Pakistan Knowledge Corridor, who gave generously of their time, expertise and insights throughout the project and gathered and shared large amounts of information with our team.

Our study team consisted of Dr. LEEANNE DUNSMORE, International Higher Education Advisor, Dr. EARL KELLOGG, Senior Fellow in International Higher Education, and MANAIL ANIS, Global Higher Education Management Expert. The study team was led by Anne-Claire Hervy, Associate Vice President for International Development and Programs, at APLU. Together the team brought expertise in international higher education, experience in administering government sponsored scholarship and exchange programs, and knowledge of the higher education sector in Pakistan and in the United States. We thank our team for their dedicated efforts during this assignment.

The project also benefitted from the contributions of Shanaz Waise, Staff Associate at APLU, who provided valuable research and administrative support throughout the project, and APLU President Peter McPherson who provided intellectual leadership.

Finally, APLU wishes also to thank all of the organizations and individuals who shared their insights, ideas, and information in support of the project.

Table of Contents

Acknowledgements.....	2
Section I - Context for the US-Pakistan Knowledge Corridor Scholarship Program.....	5
Brief overview of stated goals and plans of the Government of Pakistan for strengthening its higher education sector.....	5
APLU Understanding of Stated Goals and Theory of Change Underpinning HEC’s strategy...8	
APLU Assumptions about Prioritization of Goals	10
Estimated pipeline of potential candidates for the program.....	11
International graduate application and enrollment in the United States.....	14
Costs of a US doctoral degree	16
Planned budget for the Scholarship program per the HEC.....	18
Section 2 – Overview of literature and best practices on higher education capacity strengthening and scholarship programs	20
Integrating Human Capacity Development with Institutional Performance Improvement... 20	
Lessons learned from past individual training programs	23
Leveraging Training for Institutional Impact – Before, During and After Training	24
Government Sponsored Scholarship Programs for Study in the United States	26
Section 3 - APLU Assessment of Program Goals and Strategies with Recommendations	33
Recommendations on Aligning Program with Articulated Goals:.....	33
Section 4 – Key Considerations for Implementing the Scholarship Program.....	38
Considerations regarding outreach and preparation of students.....	38
2. Considerations regarding student placement in US doctoral programs and support during academic training	42
Considerations regarding incentive structures, job placement, and support for returning students.....	44
Section 5 - Overview of Program Implementation Options	47
Option 1. Provide “research and assistantship grants” to US universities	48
Option 2. Work through Centers for Advanced Studies to expand PhD training.....	50
Option 3. Invest in student preparation and provide “return grants” to successful students51	

Option 4. Provide scholarships funds directly to students.....	52
APLU Recommendation on Combination of Options for Optimal Results.....	53
Section 6 - Detailed Program Implementation Recommendations for the Research Grant Model	54
Summary of US University Feedback on the Research and Assistantship Grant Model.....	54
Budget Scenarios for Implementation of the Model.....	57
Key Recommendations	58
Possible supplemental pathway	60
Program Management.....	60
Options for outsourcing program management.....	63
Section 7 - Summary of Key Considerations and Recommendations	65
References.....	68
Appendix A - Methodology	69
Appendix B - Current HEC Priority Fields for Scholarship Program.....	70
Appendix C - Overview of Scholarship Programs.....	83
Appendix D - List of Carnegie Classified Research 1 and Research 2 Universities.....	84
Appendix E - Living Costs at 10 US Universities for Doctoral Study	85
Appendix F - PhD Student Financial Support and Assistantships	86
Appendix G - Budget Scenarios.....	91

Section I – Context for the US-Pakistan Knowledge Corridor Scholarship Program

Brief overview of stated goals and plans of the Government of Pakistan for strengthening its higher education sector

Earlier this year, the Higher Education Commission (HEC) of Pakistan published a draft version of its “aspirational plan” for the country’s higher education sector called *HEC Vision 2025*. The Higher Education Vision 2025 supersedes HEC’s Higher Education Medium Term Development Framework II (MTDF-II), which covers the period 2011-15. Development of the Vision 2025 document began in the closing stages of that period and is intended to reflect the successes and failures of the preceding framework. The plan was developed with input from the World Bank’s Pakistan Tertiary Education Support Project (TESP) team and consultation with key stakeholders in the higher education sector. A consultation day was also held in May 2017 with the draft policy as the basis for discussion.

The resulting plan sets out guiding principles for continued improvement of Pakistan’s higher education system which is viewed as essential to support Pakistan’s move from an agrarian state to a knowledge economy. The HEC Vision 2025 document is part of a broader *Vision 2025* agenda setting out a path for socio-economic development over the next eight years. The broader *Vision 2025* plan aims to make Pakistan the next “Asian tiger” to be achieved through seven “pillars for development”:

1. Putting People First – Developing Human and Social Capital
2. Achieving Sustained, Indigenous and Inclusive Growth
3. Governance, Institutional Reform and Modernization of the Public Sector
4. Energy, Water and Food Security
5. Private Sector and Entrepreneurship Led Growth
6. Developing a Competitive Knowledge Economy through Value Addition
7. Modernizing Transportation Infrastructure and Greater Regional Connectivity

Higher education has relevance across most if not all of these pillars, but is principally framed in terms of the first goal, human and social capital development.

The second pillar refers to inclusive growth. One of the stated objectives of the HEC Vision 2025 to improve access to education for women and people from less advantaged geographic areas. The scholarship program can play an important part in addressing the government’s inclusivity goals by making inclusivity a priority of the recruitment of students. Building the pipeline of female faculty and faculty from other underrepresented groups will generate role models for future students that will have significant long-term positive impacts on inclusive growth.

In addition, the pillar of governance reform will require teaching and research focused on public service administration, organization development and bureaucratic efficiency. To achieve progress in the energy, water and food security pillar will require research on new technology, adaptation of existing technology and people who can design and manage new systems. The private sector growth and value addition pillars will also require new knowledge and better educated people regarding how to thrive in open capital markets and global competition. Clearly, improved transportation infrastructure and

regional connectivity can be strengthened by engineering, economic and regional planning expertise that will both provide innovative solutions, new technology and people educated to design and manage modern transportation systems.

The guiding principles of HEC's Vision 2025, per the 2017 draft document, are the following:

- University education must be available to a growing number of competent and talented people, who will be builders of progressive, prosperous and productive Pakistan,
- Our system should be quickly expanded to produce more teachers, artists, information communication specialists, social scientists, natural scientists, engineers, health professionals and innovative producers of new knowledge to transform all our social institutions including all levels of education,
- Universities and other higher education institutions, as heart of a civilized society, are the most enterprising institutions to ameliorate the human condition, faculty is the heartbeat of universities, hence, every effort is to be made to increase the number and quality of faculty of our universities,
- At the beginning of the new millennium Pakistan must transform itself from an old agrarian society to a knowledge producing society exploring creative and innovative avenues of growth,
- Knowledge-based economy demands investment in human capital, innovative research and entrepreneurship for which our universities have to be radically redesigned and upgraded,
- Knowledge intensive education is the most productive asset that demands abiding by and upholding an ethical honour code of scholarly conduct by all participants and scholars to discover and disseminate new research findings and share them with policy makers and business entrepreneurs,
- The structure and purposes of our institutions of higher learning and the qualifications they offer has to comply with globally recognized standards and systems of teaching, learning and research,
- Wisdom is the outcome of virtuous search for useful knowledge which is shared more widely to create a progressive and democratic social order,
- Universities are the crucibles to refine the talents of the young so that they can lead the procession of academic excellence, meritocracy and intergenerational transformation,
- All levels of tertiary education must be socially embedded and engaged as catalysts to transform society.

The HEC Vision 2025 sets out a “holistic three tier model of tertiary education capped by 30 ranked and recognized TIER I research universities focusing on innovative research output and preparing world class scholars to discover and disseminate useful knowledge.” The three-tier plan also includes an expansion of the number and capacity of TIER II comprehensive universities and TIER III affiliated colleges (focused on technical and vocational training). Through this three-tier system, the HEC Vision 2025 articulates a goal of providing equitable access to 25% of the eligible age group by 2025, up from Pakistan's current gross enrollment ration of 10%.

This overall objective is intended to be achieved through progress around eight strategic priorities:

1. Sustain and Consolidate National Higher Education Commission
2. Increase Equitable Access
3. Excellence in Leadership Governance and Management

-
4. Increased Faculty with Highest Academic Qualifications
 5. Enhance Quality of Curricular Offerings
 6. Research Innovation and Commercialization
 7. Financial Management and Enhanced Investment
 8. IT Embedded Higher Education

Under each of these strategic priorities are a set of major programs designed to achieve the priorities.

The scholarship program under review in this feasibility study is the primary program under strategic priority 4 – increased faculty with the highest academic qualifications.

The higher-level stated goals of this program, not all of which are documented in the HEC Vision 2025 but are articulated in the PC-1 documents for the pilot phase of the scholarship program that was approved by the Ministry of Planning, Development and Reform in 2017, are to:

- increase the number of faculty with doctoral degrees from 22% to 40% in Tier I and Tier II and to 100% at Tier I institutions.
- enhance the research and academic capacity of the higher education institutions of Pakistan
- develop collaborations between Pakistani and renowned US institutions to transfer new research techniques focused on Pakistani needs.
- bring opportunities to develop research projects and simultaneously build capacity in the higher education system of both the partner countries.

For the pilot phase, the target is to support 1,500 academically qualified Pakistani students/faculty to pursue PhD studies in US universities in selected fields by 2020. In pursuit of this goal the HEC intends to train 1000-2000 potential candidates annually for admission in US universities through preparatory classes for English language, GRE or others as per admission requirements of US universities.

The scholarship program is intended to be just one component of a broader US-Pakistan Knowledge Corridor, with the following stated programmatic priorities:

- Allocate increased funds for indigenous PhD development programs that focus on Pakistani research problems and generate effective and efficient solutions through discovery of useful knowledge
- Develop a comprehensive program of preparing faculty in critically needed areas of innovative applied research
- Build expertise to enhance the technical and professional capacity of Tier I research universities to do world class research that will make Pakistan a hub of scholarly productivity
- Focus on redressing the balance between social sciences and natural sciences. New programs of advanced studies in teaching of languages, sociology/anthropology, arts and design, economics, urban planning and modern business education are needed.
- Implement the reformed, university based program of preparing knowledgeable skilled teacher for elementary, middle and secondary schools.
- Provide faculty incentives to write current and up to date textual materials for students enrolled in schools, colleges and universities

-
- Encourage HEI faculty to forge stronger links with the business and industry leaders to add value to their products developed by their innovative research
 - Expand programs of support related to institutional and individual faculty's intellectual property rights

HEC has identified a set of “priority fields” that would be eligible areas of study under the scholarship program. A full list of the fields with the associated disciplines can be found in Appendix B. The priority fields, identified by HEC in consultation with academia, industry and other stakeholders, are:

- engineering technologies
- computer hardware
- Micro-electronics
- Nano-technologies
- material sciences
- medical sciences and allied health advanced programs
- social sciences
- climate change
- water resources
- urban planning
- arts and design
- anthropology
- sociology

APLU Understanding of Stated Goals and Theory of Change Underpinning HEC's strategy

The following provides an overview of APLU's understanding of HEC's theory of change underpinning this program. This understanding has been developed by reading documents that the HEC has developed in relation to this program and through interviews with HEC senior staff, and in particular with Prof. Dr. Mahmood Ul Hasan Butt, Consultant, Higher Education Commission-Pakistan. The theory of change regarding how educating 10,000 new faculty in US doctoral programs will improve Pakistan's higher education and contribute to accomplishing Pakistan's development goals is as follows.

Faculty who have received their PhD degree from the United States are going to:

- **Contribute to the overall increase in the number of faculty needed to staff new HEIs allowing new Tier I and II universities to be established and to improve the quality and expand quantity of academic staff at current Tier I and II institutions.** The training of scholars in the United States is one of the ways that Pakistan is planning to support the expansion of faculty to significantly broaden access to higher education. This program will thus contribute to meeting Pakistan's growing demand for higher education.
- **Raise the caliber of teaching and research in higher education in Pakistan.** It is understood that only a fraction of the overall number of required faculty would be trained through this program. Per the HEC Vision 2025, Pakistan requires 95,000 new faculty by 2025, therefore the 10,000 intended to be trained through this program would meet just one tenth the total need.

Therefore, the intent behind seeking to send scholars to the United States is not because it is deemed to be a cost-effective manner to meet the overall numeric targets for faculty development. Instead, the interest in US doctoral training for some portion of the overall number of faculty required is because of the expectation that US PhD programs are among the most rigorous, highest quality doctoral training programs that exist in the world due to the significant amounts of coursework that accompany the research process. The new PhD faculty that will be educated through this scholarship program will have taken advanced courses in the discipline in which they were enrolled. They will have exposure to the latest textbooks and resource materials for high quality teaching. They will also have been exposed to new teaching styles and ways to interact with colleagues and ways to do internship or cooperative education with the private sector, public agencies and NGO organizations. The intent of the scholarship program is therefore to provide higher quality education to a select set of future faculty, with the expectation that it will lead to broader systemic improvements in the quality of higher education in Pakistan.

- **Produce better research and technology important to Pakistan's development.** A goal of the program is to develop the research capacity of PhD programs in Pakistan with a focus on addressing development challenges that are priorities for Pakistan. The Government of Pakistan has determined a set of priority fields for the program with this goal in mind of conducting research relevant to the country's context and challenges. Each PhD graduate will have done original research on a topic that is important. During this research experience, the students will interact with other scholars, learn how to find and use data and new concepts, and have their research critiqued by mature scholars in the field. This research experience will prepare graduates to develop and implement research programs back in Pakistan.
- **Build lasting relationships with US universities and with US-based scholars that could lead to ongoing research collaboration over the career of the trained Pakistani faculty.** It is understood by the HEC that ties between a major professor and/or PhD committee members can lead to a long-term collaborative relationship that can serve the Pakistani faculty member well through his or her career and can lead to deeper and broader institutional ties. In addition, doctoral research can also result in learning about new intellectual resources such as faculty in other countries or universities, databases and journals, and other sources of knowledge that will be useful in a productive research career in Pakistan.
- **Build enduring ties between students from Pakistan and the United States.** For generations, student/scholar exchange and university collaboration more generally has formed the bedrock of people-to-people ties, playing an integral role in advancing the public diplomacy efforts among nations. Through these exchanges, students and faculty have developed their international experience, language capabilities, and cross-cultural communication skills to serve as stewards of enduring partnerships between countries. This program will play a central role in helping Pakistan and the United States address regional and global challenges as research partners working collaboratively and cooperatively through their respective institutions.

To date, the US-Pakistan scholarship program was not conceived with a particular mandate to:

- **Improve the governance and administration of higher education institutions in Pakistan.** The focus of the program is on faculty development with particular attention to the research and teaching functions of faculty. HEC has other programs in place to improve the governance and administration of higher education in Pakistan.

-
- **Build specific programs (either Centers of Excellence, or new PhD programs) in a targeted way.** Across the documentation about the program and in interviews with HEC staff, there was no indication of targeting this program toward specific programs or institutions. Graduates of the program would be expected to integrate Tier I and Tier II institutions as faculty, but without any more targeted focus than that broad and not fully defined set of institutions.
 - **Support the HEC's plans to enhance IT-embedded education.** Some of the PhD students may get some exposure to IT-embedded education during their programs. However, HEC has not expressed a particular desire for the scholarship program to provide exposure and/or explicit training in this area.

APLU Assumptions about Prioritization of Goals

The recommendations in this report were developed with the following set of assumptions about the prioritization of goals for the program. This analysis of the goals falls into two categories: 1) financial efficiency goals 2) impact goals.

1. Financial efficiency goals (cost-benefit calculation)

While there is a desire to send the largest number of students possible through this program, the HEC views that total numbers of scholars studying in the United States must not come at the sacrifice of the quality of the educational experience and the potential for return to Pakistan.

It is assumed that:

- HEC would **prioritize investments that lead to higher return rates for students** supported through the program over investments in sending additional students abroad, recognizing that there is a balance to be struck. Investment in students who don't return would be viewed as a low-impact investment.
- **HEC does not want to over-invest in the scholarship program** in a way that might create perverse incentives for US universities to take on students that are not an appropriate fit or reduce the academic rigor of the program to retain poor-performing students for fear of losing funding. In other words, the government of Pakistan is interested in the US universities having as much of a stake in the success of the students funded through this program as they would other doctoral students the admit.
- **The desire to avoid paying tuition does not supersede the desire to train large numbers.** Recommendations for this program assume that the GoP would consider paying more per student if that leads overall to greater numbers, higher quality, and greater levels of return. The GoP would prioritize these goals over simply seeking the lowest-cost per individual scholar. In other words, for a given amount of funds allocated to the scholarship program, a larger number of individuals trained is more important than maximization of cost-savings per scholarship (or minimization of spending on certain categories of costs, such as tuition).
- **The GoP seeks to maximize cross-fertilization of its investments** in the higher education sector. In other words, the scholarship program, while it can be a stand-alone program, should seek maximum leverage with other HEC investments to achieve the overall goals for the sector. This may require coordination across HEC investments and a structuring of the scholarship program to align with other HEC investments.

2. Impact goals

In terms of prioritization of goals related to the impact of the scholarship program the key goals *in approximate order of importance* are the following:

- Returning scholars should be **well-prepared to establish and implement a high-quality research agenda** upon return to Pakistan. Further, their research **should be relevant to Pakistan**. The program must therefore put in place the incentives and requirements that would help ensure the relevance of the research supported through this program.
- In some fields more so than in others, returning scholars should also have an understanding of the practices and policies that promote the **commercialization of research** products, an understanding of and/or experience with **private sector-university collaboration**, including but not limited to experience with research parks.
- The Government of Pakistan places a high priority on **advancing equitable access** to higher education. This means addressing gender-based inequalities and socio-economic ones. Therefore decision-making about “merit” should take account of multiple factors – not just academic credentials and test scores.
- **Access to higher education will be expanded** because this program will contribute to the increase in faculty numbers.
- **The quality of teaching will be improved**. Returning faculty through this program will have significant teaching responsibilities in addition to their research. The program has not been articulated in a way that suggests it is intended to train faculty for graduate level teaching in particular; instead, it is anticipated that the program will improve undergraduate and graduate level education.

Estimated pipeline of potential candidates for the program

As part of APLU’s overview of the broader context in which the scholarship program would be situated, a pipeline analysis was conducted to determine the feasibility of sending 1500 candidates to the United States for doctoral study during the pilot phase. The pipeline analysis looked at the number of Pakistani GRE test takers and their performance; the number of students recruited for HEC ‘s Talent Farming program; the number of GRE test takers who apply to the Fulbright Scholarship Program; and the overall acceptance rates of those test takers to doctoral programs in the United States.

Given that the GRE test is a requirement for those who apply to graduate school in the United States, it is a critical variable in determining the pipeline. APLU conducted an analysis of the GRE data available as the starting point for estimating the potential pipeline for the program. The analysis looked at the number of GRE test takers in Pakistan between July 1, 2012 and June 20, 2016 and test takers’ performance over the same time period. In 2016, 2,823 Pakistani students took the exam during the time frame examined. The mean verbal reasoning scores was 147.0 with a 7.9 standard deviation and the quantitative reasoning score was a 152.5 with a 7.7 standard deviation. The mean analytic writing score was a 3.4 with a standard deviation of 0.08. These scores represent the mean of test takers during the 2015-2016 period. The mean verbal and quantitative reasoning scores combined, are consistent with the scores necessary to qualify for both the Fulbright and the HEC scholarship pilot program. HEC candidates must have a combined score of 300 on the verbal and quantitative reasoning section of the GRE test. Fulbright candidates must also have a GRE combined score of 290-300 depending on the discipline of study.

The model below has been built using the following assumptions:

-
- The number of GRE test takers in Pakistan will continue to increase at an annual rate of 13% given an analysis of the trend since 2012.
 - While GRE test scores are good for five years, it can be assumed that most candidates would submit their latest test scores with their applications.
 - HEC in partnership with the U.S Educational Foundation of Pakistan (USEFP) will continue to fund 50 Fulbright doctoral scholarships per year over the next five years.
 - One thousand qualified students will participate in the Talent Farming program in the first two years of the program and 2000 will participate in years three and four. These students will generate an additional 600 test takers in the first two years and 1200 test takers in years three and four, assuming some portion in the talent farming pool would have been in the normal pool of test takers;
 - In 2016, Fulbright received 1685 applications for their graduate programs. 28% of those applications were for doctoral programs.
 - Assuming that 28% of GRE test takers in 2016 were interested in doctoral study, 6.15% of all GRE test takers interested in the doctoral program received a Fulbright. APLU's understanding is that Fulbright is interested in developing a more competitive pool of applicants for its program to place in competitive doctoral program in the United States.
 - It can also be assumed that most qualified candidates would be motivated to apply to the Fulbright Program over the HEC scholarship program given the level of support and the returning obligations.
 - The pool of qualified applicants for the HEC scholarship program would be GRE test takers above the GRE mean each year who do not apply and/or are not selected for the Fulbright program.
 - The estimated percentage of GRE test takers who will gain admission to a US PhD program using Fulbright data as a proxy is 13%.

Based on these assumptions we have determined the pipeline of doctoral candidates for the HEC scholarship program is as follows:

Figure 1. Pipeline Analysis 2017-2021

	2017	2018	2019	2020	2021	Total
Normal pool of GRE test takers in 2017 intending to pursue a PhD - 17% of total GRE test takers in Pakistan		812	1038	1172	1325	3535
HEC Talent farming – 1000/year 2018-19, 2000/year 2020/21. Assume overlap with normal pool of test takers		600	600	1200	1200	3000
Total GRE test takers intending to pursue a PhD		1412	1638	2372	2525	6535
Estimated percentage of GRE test takers who will gain admission to a US university - based on Fulbright data		13%	13%	13%	13%	13%
Number of students admitted to a US doctoral program		184	213	308	328	1033
Number of HEC scholars - Total admitted, minus 50 who opt for Fulbright Fellowship	35	134	163	258	278	868

These estimates were made using the data available to APLU, and could be enhanced with more detailed data if HEC has access to such data. An assumption was made that in the normal pool of GRE test takers intending to pursue a PhD, a large number will seek to take advantage of HEC’s Talent Farming program. Therefore in APLU’s calculations, only a percentage of the total Talent Farming pool was considered to be additive to the regular pool of test takers.

In addition to the analysis above determining the number of possible students to that could be sent to the United States, three additional factors should be considered after the phase of application preparation and admission. First, some students will apply to programs in the United States and in other regions. Not all students who will be admitted to a US program will choose the United States if they also gain admission to a program in another region. Second, HEC must anticipate some attrition on the basis of visas. APLU was not able to determine the precise percentage of student visas that were successfully granted in recent years, but estimates it has been approximately between 90-95%, based on USEFP’s feedback that they have not had significant attrition problems related to visas. Third, based on data provided by HEC, it should be anticipated that roughly 2-2.5% of students will not complete their program, either because they drop out of their program or are not able to perform to the standards required by the university. This rate is remarkably low when compared to the average completion rates at US doctoral programs which is around 50%.

International graduate application and enrollment in the United States

In 2015-2016 academic year, over 1 million international students enrolled in higher education institutions in the United States,¹ representing five percent of the 20 million students enrolled in US higher education. This number also included nearly 150,000 participating in Optional Practical Training (OPT) following completion of their studies. Pakistan sent a total of 6,141 students to the United States in 2015/2016 representing less than one percent of the international student population. At the graduate level, 2,373 students from Pakistan were enrolled in 2015/16.

A recent survey conducted by the Council of Graduate Schools,² collected data from US colleges and universities on application and enrollment data from international students seeking US master's and doctoral degrees. The following data provides an overview of the landscape for international student applications and enrollments.

- 270,236 applications were submitted by prospective international students to US doctoral programs in Fall 2016.
- 42,935 offers of admission were made to international students. Therefore, the admission rate for international doctoral student applications was 15.9%.
- Out of the total numbers of international students admitted at the doctoral level, 20,684 enrolled in doctoral programs, for a yield of 48%.

Data from the Council of Graduate Schools' 2016 survey give an approximation of average admissions rates to US doctoral programs by region and country of origin for the Fall 2016 cycle. The data is captured in Figure 2.

¹ "Open Doors 2016 Executive Summary." *IIE*, Nov. 2016, www.iie.org/en/Why-IIE/Announcements/2016-11-14-Open-Doors-Executive-Summary. Accessed 2017.

² Okahana, H. (2017). *International graduate applications and enrollment: Fall 2016*. Washington, DC: Council of Graduate Schools. http://cgsnet.org/ckfinder/userfiles/files/2017_International_Survey_Report_Final.pdf. The 2016 CGS International Graduate Admissions Survey population consisted of 741 US colleges and universities. Institutions were asked to report the number of total applications from and offers of admission to prospective international graduate students, as well as first-time and total international graduate enrollment for Fall 2016. The 2016 survey was administered between September 26 and October 31, 2016. A total of 392 institutions, or 53%, responded to the survey.

Figure 2. Application and Admission Data by Region/Country of Origin, Fall 2016 Admission Cycle.

Regions	Total Numbers of International Doctoral Applicants	Total Offers of Doctoral Admission	Doctoral Admission rate estimate	% of Graduate Applicants seeking Doctorate
Total	270,236	42,935	16%	32%
Asia	180,195	26,480	15%	27%
China	96,146	14,960	16%	30%
India	34,573	4,500	13%	14%
Japan	1,953	341	17%	42%
South Korea	21,974	2,767	13%	69%
Taiwan	7,592	934	12%	38%
Europe	24,680	4,450	18%	62%
Latin America & Caribbean	10,938	2,284	21%	43%
Brazil	2,537	471	19%	50%
Mexico	2,292	462	20%	44%
Middle East & North Africa	33,568	5,494	16%	58%
Iran	21,187	3,377	16%	80%
Saudi Arabia	5,734	939	16%	32%
North America (Canada only)	6,219	1,156	19%	52%
Oceania	1,336	242	18%	53%
Sub-Saharan Africa	7,486	1,230	16%	35%

Data Source: Council of Graduate Schools. *International graduate applications and enrollment: Fall 2016.*

More recent data from a survey of graduate schools indicate that more graduate deans are seeing declines in admission yields of prospective international graduate students than of prospective US citizen/permanent resident graduate students.

This survey also showed the declines in admission yields for prospective international graduate students were more pronounced at R2 and R3 institutions (Higher or Moderate research activity (R2 & R3)) as contrasted to the R1 institutions.

International graduate student applications by % were as follows:

- Engineering 28%
- Social and behavioral science 15%
- Physical and Earth science 13%
- Math and Computer Science 12%
- Biological and Ag Science 11%
- Business 6%
- Other 15%

US institutions saw a lag in growth in the total number of international graduate applications, from 3% in 2015 to 1% in 2016. The slowdown in application growth occurred despite a 4% increase in the number of applications from prospective Chinese graduate students, who constitute the largest subgroup of international students both in terms of applications and enrollments. The overall decrease in application growth was due to the combined effect of decreases in applications from important sending countries and regions: India (-1%), the Middle East and North Africa (-5%), South Korea (-5%), and Brazil (-11%).

There continues to be substantial concerns at US university graduate schools over what the new immigration regulations will be and their effect on applications, admissions and yield of international graduate students. These trends may impact number of students choosing to apply for doctoral study in the United States through this initiative. Declines in overall numbers of international students coming to the United States could improve the admissions rates for Pakistan.

Costs of a US doctoral degree

According to the National Center for Education Statistics, the average graduate tuition and required fees in degree-granting postsecondary institutions from 2015-16 ranged from approximately \$8000 annually to over \$40,000. Figure 3 below provides the data by percentile of costs. This data includes all public institutions, and reflects *in-state tuition*, which is significantly lower than tuition charged for out-of-state students. All public universities, furthermore, have state laws that govern their tuition and fees and often restrict universities from offering in-state tuition to out-of-state and international students. Out-of-state tuition is often double or triple the level of in-state tuition.

Figure 3. Average graduate annual in-state tuition and required fees in degree-granting postsecondary institutions, 2015-16

Institutional Type	Public institutions			Nonprofit private institutions		
	25th	Median	75th	25th	Median	75th
In-State	\$8,242	\$10,750	\$13,193	\$13,878	\$22,490	\$40,670
Out-of-State - Low estimate (2 x in-state)	\$16,484	\$21,500	\$26,386	N/A	N/A	N/A
Out-of-State - Higher estimate (2.5 x in-state)	\$20,605	\$26,875	\$32,983	N/A	N/A	N/A

Source: In-State tuition data from National Center for Education Statistics³

Added to these costs are living expenses for students, insurance costs, book and material costs and research costs in some cases. Regarding living costs, these vary significantly by location, with urban areas and larger metropolitan areas costing significantly more than more remote locations. There are also laws that vary state by state governing minimum living stipends for graduate assistantships. APLU undertook an analysis of living costs across 11 universities.⁴ The mean annual living costs from these 11 universities was \$20,250 per student. The median of this data was \$18,700. The range of these data was from \$14,500 – \$33,874 per student annually. Appendix E provides some additional data regarding living costs.

Altogether, the costs of education in the United States are substantial. In many cases the total costs of a year of PhD study is around \$50,000 - \$60,000. While these costs may be covered through a variety of sources, including by working for the university through an assistantship in exchange for a partial or complete tuition waiver, they must be covered somehow. As indicated further below in the discussion of visa requirements, international students coming to the United States for study must demonstrate they are able to cover the full cost attendance including tuition, fees, living expenses, books and incidentals, health insurance and travel costs, to be issued a visa. If students are granted tuition and fee waivers and assistantships, documented proof of this support is required to obtain a visa.

³ National Center for Education Statistics. "Average graduate tuition and required fees in degree-Granting postsecondary institutions, by control of institution and percentile of charges: 1989-90 through 2015-16." *National Center for Educational Statistics*, 2016, www.nces.ed.gov/programs/digest/d16/tables/dt16_330.50.asp.

⁴ A survey was taken of eleven US universities regarding the costs of living for a year for a doctoral international student. These costs included room, board, books, health insurance and transportation expenses. No tuition or related fees were included in these costs. None of these costs included expenses for families who might accompany the student. Graduate school admission offices require documentation that students can pay these costs as a part of the graduate school application process. The universities surveyed were: Arizona State University, Michigan State University, Mississippi State University, Ohio State University, Purdue University, New York University, Southern Illinois University, University of California at Davis, University of Illinois at Urbana Champaign, University of Utah, and Wayne State University.

Data from the 2015 Survey of Earned Doctorates⁵ reveal that even with various sources of support for doctoral study, student debt levels from doctoral degrees are not insignificant. Of note is the fact that debt levels are much higher for US citizens and permanent residents than they are for international students. Figure 4 below shows the comparative debt levels between these two groups. The average international student has less than 30% of the debt of the average US citizen or permanent resident.

Figure 4. Doctoral Student Debt by Citizenship/Residency and Visa Status

Graduate debt				
	US citizen or permanent resident		Temporary visa holder	
Mean level of debt	\$19,567		\$5,685	
	Number	Percent	Number	Percent
No debt	18,903	56.60%	11,851	78.20%
\$10,000 or less	2,790	8.40%	1,382	9.10%
\$10,001–\$20,000	1,938	5.80%	562	3.70%
\$20,001–\$30,000	1,601	4.80%	344	2.30%
\$30,001–\$40,000	1,164	3.50%	220	1.50%
\$40,001–\$50,000	984	2.90%	209	1.40%
\$50,001–\$60,000	938	2.80%	143	0.90%
\$60,001–\$70,000	739	2.20%	91	0.60%
\$70,001–\$80,000	720	2.20%	71	0.50%
\$80,001–\$90,000	1,144	3.40%	132	0.90%
\$90,001 or more	2,467	7.40%	156	1.00%
Total	33,388	100.00%	15,161	100.00%

The scholarship amounts proposed in the sample budgets included in this report are all significantly lower than the full costs of PhD study reflecting an expectation that the US universities will cost-share substantially. Depending on the level of the budget provided by the GoP, the cost share of the US university may be between 40 - 60% of the total costs of a PhD program. Without a cost-share, the scholarship costs would be significantly higher.

Planned budget for the Scholarship program per the HEC

The proposed financial model for the US Pakistan Knowledge Corridor, (Phase I), approved by the Higher Education Commission in October of 2016, provides scholarship support for doctoral candidates. The

⁵ The Survey of Earned doctorates is an annual census of individuals who receive research doctoral degrees from accredited US academic institutions. The survey is sponsored by six US federal agencies: the National Aeronautics and Space Administration, National Endowment for the Humanities, National Institutes of Health, National Science Foundation (NSF), Department of Agriculture, and Department of Education. These data are reported in several publications from NSF's National Center for Science and Engineering Statistics. The most comprehensive and widely cited publication is called: Doctorate Recipients from US Universities.

Phase One (PK-1) enrollment plan is as follows; 200 scholars enrolled in US college and universities in AY17, 300 in AY18, 500 in AY19 and 500 in AY20 for a total of 1500 scholars enrolled by 2020. The total amount allocated for the program is RS 18,810.916 million. This amount is intended to cover a travel grant, a monthly living stipend, medical insurance, return home airfare, and a one-time settling in allowance. The scholars are to either cover the tuition expenses themselves or compete for Research Assistantship (RA) or Teaching Assistantship (TA). The assumption is that those granted an RA or TA position would be granted fellowships that include a tuition waiver.

Section 2 – Overview of literature and best practices on higher education capacity strengthening and scholarship programs

Integrating Human Capacity Development with Institutional Performance Improvement

From the inception of foreign assistance programs in the 1950s, human capacity development has been a major focus of support. This support has consisted of both in-country training (usually externally-developed) designed and delivered in tandem with technical assistance and short-term and long-term out-of-country training (generally leading to an academic degree) either in the United States or in third countries. From the 1960s to the mid-1970s USAID supported a number of “best and brightest” programs, where students were selected according to academic merit for placement in US higher education institutions. The programs aimed at building *individual* skills and knowledge intended to fill human resource gaps in newly-independent nations replacing departing colonial bureaucrats and leaders, primarily in public institutions, including universities.⁶ A prevailing assumption was that highly-trained returned graduates would drive the institutional changes needed for future development.

By the early 1970s, there were increasing concerns that “best and brightest” programs that supported training (often at the Bachelor's level) for individuals not already employed were contributing to “brain drain” and were in fact inhibiting the strengthening of existing institutions. As a result, programs were adjusted to focus long-term training on faculty and public-sector *employees* as a way to strengthen their institutions. The assumption was that younger individuals without any prior work experience in their country were less likely to return than individuals who had already established themselves professionally and had employment to return to. USAID’s African Graduate Fellowship Program (AFGRAD) was a leader in this effort, and over a 40-year period this program trained over 3,000 Africans in graduate degree programs in the United States. Almost all had undergraduate degrees and many were already employed at institutions. Over 90 percent returned. The USAID focus at the time was clearly institution-building, using individual training as the primary mechanism. Other programs, such as the Collaborative Research Support Programs (CRSPs), promoted advanced agricultural training for emerging researchers, which also aimed at building stronger research institutions, training over 5,000 students to degrees in agriculture. Other priority development sectors, such as health and education, had similar programs targeting specific institutions working in those sectors.

Many of these degree programs included supplementary workshops organized during vacation periods where students gathered at different venues to learn “soft” skills they would need to assist in their career development and help their home institutions improve. Management training emerged as a key topic most trainees were required to take as part of their US training program.

These ambitious programs achieved some impressive results, according to numerous evaluations. However, the programs were all built on the premise that individual training would lead to sustainable institutional change. Yet it cannot simply be *assumed* that training helps build an institution’s capacity. Under certain circumstances it certainly can achieve that objective. In other circumstances, however, it can produce little or no change at the institution. Worse, it can sometimes inflict a negative impact on

⁶ Early efforts also included, in some cases, major institutional building projects where US faculty were resident in new higher education institutions and USAID provided not only human capacity development but also the bricks and mortar for new institutions (such as the creation of Alemaya University in Ethiopia in partnership with Oklahoma State University).

an institution's capacity, such as when an employee leaves the home institution for greener pastures due to inequities, lack of resources or an overwhelmingly negative work environment.

The principal reason training did not lead in many cases to sustainable institutional change was the lack of a link between the performance needs of an institution and the training offered. Often, training to individuals is provided without a prior in-depth performance analysis of the institution in which the individual will operate. Therefore, the opportunity to identify institutional performance gaps and their root causes and to customize the training for the needs of the institution is missed. In some cases, training was not the appropriate solution to righting a sinking institution or to help correct its course. For at least twenty years the mantra in institutional performance improvement associations, such as the International Society for Performance Improvement (ISPI) and American Society for Training & Development (ASTD), has been that "training is not always the solution to closing performance gaps in an institution." Recognizing this fact, in the early 2000s, USAID adopted this organizational development principle in its Human and Institutional Capacity Development (HICD) model. The HICD approach is summarized and compared to training in Figure 5 below.

Figure 5. Comparison of Training to HICD

TRAINING	HICD
Focuses on only individual performance – skills and knowledge	Focuses on five performance factors*
Sequence of actions leading to a degree or certificate	A process
Measurement limited to obtaining degree or certificate	Continuous measurement process
Based on individual needs	Based on organizational needs
Evaluated by individual performance	Evaluated by Organizational Performance
Focus on individuals to obtain results	Focus on systems approach to improve organizational performance
Single type of intervention (training)	Multiple types of interventions
Based on project outputs	Based on organizational commitment
Training needs assessment - sector, individual, institutional	Performance assessment
Builds capacity of individual to perform	Builds capacity of organization to produce results
Results-oriented at individual level	Results-oriented at organizational level
Can be ad hoc or long-term but skills & knowledge focused	Must be systematic
<p>* Five performance factors: 1) job expectations; 2) performance feedback; 3) work environment & tools available; 4) motivation; 5) skills & knowledge.</p>	

Source: Human and Institutional Capacity Development Handbook, USAID, October 2010.
http://pdf.usaid.gov/pdf_docs/PNADT442.pdf

Lessons learned from past individual training programs

The following lessons have been learned from past experience with donor-funded training programs that could be taken into consideration for Pakistan's scholarship program.

1. **An overemphasis on the individual's training objective.** Many scholarship programs are by and large designed to focus on the individual, rather than the institutions from which the individual came and to which they will return. As a result, long-term training and post-training activities are largely designed to support individual career development. Often a sector-wide approach is taken to analyze needs, which means that once a trainee is selected in response to an identified sector-wide need, attention turns to meeting the individual's training needs.
2. **Institutional strengthening and training conceived as separate.** In programs with dual mandates to train individuals and build institutions, the dual goals tend to be implemented with little crossover leverage. Evidence shows that after trainees return to their country they often face challenges in resettling into the institutions of their country, which can lead to brain drain.
3. **In programs with a clear focus on institutional strengthening, training is viewed as the driver to improve institutional performance** with little attention given to non-training drivers, such as incentive structures, administrative and management structures and processes, infrastructure, organizational culture, etc.
4. **Institutional needs assessments are often biased towards identifying gaps in human resources, and particularly technical knowledge.** In programs where an appropriate institutional needs assessment does inform the program's activities, activities still favor individual knowledge-building over institution-building tools such as change management or leadership development.
5. **Minimal connection to home-country institutions.** Often, links are weak between the individual's training program and the needs of the home institution. In some cases the training provider had no knowledge of the institution, or the student had not been employed by an institution prior to being selected and admitted. Rarely in training programs are funds allocated to conduct a performance assessment of an institution or to attempt to identify the needs in order to link a student to addressing those performance constraints.
6. **Increasing but still limited attempts to build soft skills.** Recently there has been increasing recognition of the need to integrate soft skills (management, leadership, presentation, communication, etc.) into academic/technical training. In practice, however, in degree training programs in particular, there does not appear to be a particular focus on soft-skills development beyond what is normally included in their academic programs for all students.
7. **Action planning not generally integrated into training programs.** Action plans can provide a mechanism for students to set goals upon which to focus after their return home. Are the soft skills being mastered? How are the trainee's individual goals tying into a broader institutional objective and how is the trainee engaging others at the institution? A living, flexible and monitored action plan, developed by the student with assistance from others, such as a mentor, can be a key to migrating the focus of individual training to institutional strengthening. Action planning can also be entirely focused on the career of the individual, however, which would not directly serve an institutional strengthening purpose. Therefore, action planning should be developed within an institutional strengthening framework.
8. **Mentoring can be better utilized as a tool for institutional capacity development.** The power of mentoring to support training appears to be increasingly appreciated. However, good

practices for designing and implementing formal mentoring programs are not well understood and, often, mentoring is not done with an eye toward institutional strengthening but rather individual career development.

Leveraging Training for Institutional Impact – Before, During and After Training

To build institutional capacity, programs should be designed to go beyond improving individual competencies or identifying sector skill deficiencies, to linking training to specific institutional performance gaps. In any institutional reform program, those pressing for change will encounter resistance. There are entrenched interests working against change – skeptics sabotaging anything new and citing previous attempts that failed, and those desiring change but fearful of their jobs or status in a new work environment. Scholarship program managers can tie individual training to institutional strengthening by preparing trainees for their return home and helping institutions to capitalize on their employees' training. Some challenges trainees are likely to meet include jealousy from peers (for not being selected), adjusting to a different organizational context, inadequate research support, and encountering peers unreceptive to new ideas and methods acquired during overseas training. To help pave the way for returning trainees, program implementers can provide trainees with tools and effective approaches to enable them to return under the best circumstances where they can become long-term catalysts for institutional strengthening.

Preparing trainees to have an impact on their home institutions is an effort that should be undertaken throughout the life of a program – not only towards the end of the training period. Actions for boosting post-training impact on institutional strengthening should be built into a program's core and should be taken before training begins, during training, and after trainees have returned home. A dynamic action plan for each student can crystallize these issues in the minds of the trainees and prepare them for hitting the home turf fully aware of the challenges they will face.

Preparations before Training Begins

- Program implementers should have **a clear picture of the knowledge, skills and attitudes (KSA) each trainee will acquire by the end of training.** The KSA to acquire should go beyond the technical area, such as plant physiology, to include soft skills such as leadership, collaboration with peers, working on teams, communication, etc. Trainees can make specific commitments to introduce changes in their institutions back home and their communities. In short, trainees' plans should include "giving back" and sharing, drawing from their entire overseas experience. The plan for giving back should be developed closely with the trainee's own institution to promote sustainability.
- Require each trainee to develop **a comprehensive work plan** (or action plan) that states the knowledge, skills and new attitudes they hope to acquire during training. Accompanying this refinement of the general training objective, trainees would detail in their plan how they will reach specific performance goals as described. They should reflect on the way achieving these goals would affect their research, contribute to changes in their home institution, and improve the wellbeing of others working in their sector. With a work plan, or action plan, in place, students can monitor their progress easily for themselves and for those responsible for training them. They can also modify the work plan during training so it reflects both the needs they discern as they become involved in their professional life, and their institution's needs. Trainees could also be asked to engage in regular communication with colleagues and administrators in their home institutions.

-
- Consider involving selected trainees in a **root cause analysis** of their institution's current and future performance, followed by groups of students designing interventions (solutions) to be introduced. If the institution is involved in this process, some of the proposed interventions could be supported by the trainees during their overseas program, such as assisting their home institutions in gaining access to documents and resources available from the overseas institutions.
 - Arrange for program implementers to query candidates applying for scholarships about their knowledge of the current trends in their sector. The objective is to **inspire trainees to think about the "big picture"** in their field so that they can develop as future leaders. Program implementers have reported receiving positive feedback from trainees who were challenged before they joined the program to consider their training beyond receiving a graduate degree.

Actions to Take During Training

- **Networking** is an important way to leverage institutional impact during training programs. Providing opportunities for trainees to network with career professionals and with trainees in their program cohort, can help them build a learning resource outside of the classroom. Social media tools such as LinkedIn or a Google Community are great resources for program implementers to use for networking efforts.
- **Facilitate trainee's engagement with the home institution.** Trainees, especially those already employed, should maintain close ties to their home institutions during training, for many reasons, including to solidify their career path and to increase their ability to bring about changes at their home institutions. Monthly conference calls between the trainee and various contacts can be part of the required tasks in an action plan. Through regular communication the trainee learns about developments at the home institution and helps ensure links between the trainee's program and the needs of the home institution. Trainees can be asked to summarize these monthly calls as part of the scholarship requirements. Trainees can also write reports about the institutional changes and needs they have observed in their home institution after visits home. Finally, trainees can serve as information resources for colleagues back home who have difficulty accessing information.
- **Trainees should generally conduct research in their home country** or in a similar developing country setting. This appears to be already a widespread practice among training implementers today. In-country supervisors or faculty advisors can assist the trainees in developing a thesis topic that addresses a critical local problem, and they can add context, support and advice while the trainee is conducting research. Trainees can also collaborate with colleagues back home in conducting research, which can help mitigate resistance when the trainee returns.
- **Strengthening ties between sending and receiving institutions** can also increase the potential of trainees to impact their home institutions. If a more formal arrangement can be made between the host universities and Pakistani universities, there could be more understanding of the needs of trainees' home institutions. This can help the host institutions in shaping each trainee's degree program to fit the home institution's needs.

Follow up After Training Ends

- Assist trainees in an ongoing manner in thinking through **how to share their newly-acquired knowledge, skills and attitudes with others** upon returning home in a way that minimizes

jealousy and maximizes the transfer of knowledge. If an action plan was developed, support to faculty as they implement their action plan can enhance their impact.

- Develop a rigorous mentoring program to support faculty upon return. A model to consider for mentoring is that created by [AWARD, the African Women in Agricultural Research and Development](#).
- Support the faculty's continued academic engagement with the home institution. Personal ties often form the basis of the most productive institutional partnerships.

Government Sponsored Scholarship Programs for Study in the United States

As part of the feasibility study, the project team examined student mobility scholarship programs to the United States sponsored by foreign governments and by the US government. These programs include support for bachelors, masters and doctoral degree training. While these scholarship initiatives are not new, they are increasing in number in response to a growing global demand for tertiary education. The comparative assessment included the following programs:

- Brazil's Scientific Mobility Program (formerly Science without Borders)
- Republic of Kazakhstan's Bolashak Scholarship Program
- Saudi Arabia's King Abdullah Scholarship Program (KASP)
- Indonesia's Educational Endowment Fund Scholarships
- Vietnam's International Education Development Program (Project 911- VIED)
- USAID's Innovative Agricultural Research Initiative (iAGRI)
- USAID's Borlaug Higher Education Agricultural Research and Development (BHEARD) Program

The two USAID-sponsored programs provide scholarship to students as well as resources for building institutional capacity. Therefore, these two programs are discussed separately from the other government sponsored programs.

The review included an overview of existing government-sponsored programs available in writing and on government websites, a literature review on government-sponsored programs as well as interviews with key individuals involved in the administration of their respective programs. These individuals included government officials, university officials responsible for the administration of government-sponsored programs and administrators from third party providers responsible for overseeing government-sponsored programs. Appendix C (in Excel format) provides a summary overview of these programs across the range of categories discussed below.

Comparison of Foreign-Government Sponsored Scholarship Programs

Program goals: While these programs vary in size, scope and foci, these investments are generally driven by the expectation that international education and human capital development contribute positively to economic prosperity for the sending country, as well as provide the sending country with the knowledge and skills needed to address pressing challenges of local, regional and global relevance. Government-sponsored educational programs furthermore are viewed by the sponsoring entities as key to supporting the educational diplomacy efforts of nations and helping to build enduring ties between the people of the United States and other nations.

Specific programmatic goals expressed across programs included the desire to make a significant contribution to the development of a nation’s human resources and to provide their citizens with opportunities to enroll in college and universities in the United States. Some were designed to support transitions to an innovation-driven economy and strengthen specific sectors including the public sector, the science and technology sectors, and/or higher education sectors more specifically. Overall these programs are designed with the general goal of improving the overall economic prosperity of their respective countries.

Equity and access goals. Most government-sponsored scholarship programs are academic-merit-based in their approach and do little to address inequality of access to educational opportunities in their societies. In some programs quotas are established to address greater participation from underrepresented groups, but quotas do not always prove to be successful. Gender parity is often expressed as a goal and in one case – Kazakhstan – this has been achieved; while initially more men were selected than women for the Bolashak scholarship program, 50% of the scholarships were awarded to women by 2013.⁷ In other cases, cultural barriers limit the achievement of gender parity. For example, women are eligible for consideration for the KASP scholarship program but must be accompanied by a full-time male guardian.

Marketing and outreach efforts often encourage selection from both urban and rural areas with an interest in supporting students from a wide variety of socio-economic backgrounds. Other characteristics of program participants from urban areas where GDP per capita is above average suggest that recipients of most government sponsored program tend to come from higher-income families.⁸

Number of awards. Programs vary greatly in scope. Among the programs examined, some sent as few as 17 students in the first year (Bolashak), growing steadily over time’ over ten years, between 1994 and 2013 the Kazakh government awarded 9,250 scholarships for study in 33 nations.⁹ At the other end of the spectrum is the King Abdullah Scholarship Program (KASP), representing one of the largest outbound student mobility programs in the world. According to the Minister of Finance over 185,000 students have participated in the KASP program since its inception in 2005 and the Minister of Higher Education announced its support for the program through 2020. Large target numbers (over 100,000 scholarships) for Brazil’s Science without Borders made it difficult to find highly qualified applicants over the course of the program.

Similar in size and purpose to this initiative, Vietnam’s 911 scholarship program was designed in 2010 to add 10,000 doctoral degree recipients to the academic workforce by 2020. The program was designed to strengthen universities in Vietnam and build collaboration between universities in Vietnam and partner institutions around the world. Through this program, on average, 1,200-1,500 persons are selected each year and placed in the United Kingdom, Australia, New Zealand, United States, Canada, France, Germany, Belgium, Russia, Japan, China, Singapore, South Korea and other countries. As of September 2016, 5,422 scholars have participated in the program and 168 candidates have been placed in the United States.¹⁰ Russia is the largest recipient of Vietnamese doctoral students through this program, with over 2,225 placed since the program’s inception.

⁷ “History of the Program.” *Bolashak International Scholarship - Center for International Programs*, 2013, bolashak.gov.kz/en/o-stipendii/istoriya-razvitiya.html. Accessed 2017. Web.

⁸ Ibid.

⁹ Perna, Laura W., et al. “Understanding the programmatic and contextual forces that influence participation in a government-Sponsored international student-Mobility program.” *Higher Education*, vol. 69, no. 2, Feb. 2015, pp. 173–188. Print.

¹⁰ Vietnam Ministry of Education and Training, 2017, <http://vied.vn/en/>.

Overall, the number of scholarship students supported through each initiative has generally been driven by the amount of funding available for the program.

Types of support. While the type of support varies, every government in our study provided some tuition support for its scholarship recipients. Average annual per-person expenditures were between \$35,000-\$40,000 for most programs.¹¹ Some examples are included below:

The Saudi government fully funds the costs of education for each scholar supported through the KASP program, and its current investments total nearly US\$ 2.4 billion. The government of Saudi Arabia covers full tuition, monthly living stipend, airfare, health insurance, books and intensive language instruction if necessary. The scholarship program also covers travel vouchers for family members. Additionally, student may qualify for additional support at the masters and doctoral degree levels, including funding to attend academic conferences.¹²

Indonesia's funding for doctoral study evolved over the course of the program based on the needs of the scholarship students. Initially envisioned as a three-year scholarship program, the funding scheme was altered in 2014 to include four years of funding provided universities were willing to provide scholars with English and pre-academic training for a semester prior to enrollment. If needed, tuition waivers for year five were granted by universities. Awards covered tuition for up to four years, health insurance, living allowances that varied by location, fees associated with visas and passports, textbooks and transportation costs. Approximately \$35,000 was awarded per student annually.

A network of over 800 universities worldwide are recipients of sponsored students from the government of **Vietnam** and universities work with the Ministry of Education and Training to develop cost-sharing arrangements in support of sponsored students. For example, the University of Arizona support is as follows: Project 911 VIED fellowships will provide fellows with the opportunity and financial assistance to complete their PhD program in Engineering at Arizona State University. The general duration of a PhD program is four years, during which time the fellow must continuously meet the academic qualifications required by VIED and ASU. Scholars are awarded a total of \$27,000 for year 1 and year 2. The funds will be paid directly to the host university. The award amount covers application fees, required tuition and fees for the academic year (including the summer sessions), and required health insurance for the calendar year. The remainder of the fellowship award provides a stipend to the student. After year two of satisfactory academic progress, VIED scholars compete for research and teaching assistantships through a competitive award process. If students do not qualify for the assistantship after the first two years of the program, they are awarded an MA degree and are no longer supported in the doctoral program. ASU leverages faculty active in research to recruit fellows who will be successful at receiving funding for the Years 3- 5 of the PhD program. Thus, ASU makes every effort to recruit fellows aligned to research funding opportunities and guarantee funding.

Degree/disciplines supported. Government sponsored programs provide support for students at the BA, MA and doctoral level. When specified, approved graduate programs are primarily in STEM fields, but also include a number of professional degrees including law, medicine and business.

Bridging programs. Insufficient English language skills was an important limiting factor for a number of programs, and presented a significant challenge participation from rural areas. Foreign language proficiency requirements for government-sponsored programs were lowered for students from rural

¹¹ British Council and Deutscher Akademischer Austauschdienst (DAAD). "The rationale for sponsored students to undertake international study: An assessment of national student mobility scholarship programmes." *British Council*, 2014.

¹² Saudi Ministry of Higher Education, 2017, <https://www.moe.gov.sa/en/pages/default.aspx>.

areas in Kazakhstan’s Bolashak program, and a two-year English Language Program was established in support of these students.¹³

Intensive language training for KASP recipients is also built into the scholarship. KASP recipients participate in pre-departure orientation program to learn more about their host country and their system of higher education.

In the case of Indonesia and Brazil, English language preparation programs were added in subsequent years to increase the number of highly qualified applicants for the scholarship program.

In the BHEARD program, the implementing partner, Michigan State University, provides graduate students with English language training support as well as guidance on preparing for the GRE and TOEFL examination. USAID coordinates pre-departure orientation and training for program participants in collaboration with Michigan State.

Implementation approaches. Governments have either invested in administering the scholarship program within their respective ministries, embassies and missions and/or work with implementing partners, including US universities in support of their scholars. This decision is driven by internal expertise and resources and in some cases evolved over time.

The **KASP** program, one of the largest, is administered by the Ministry of Higher Education and supported through the Saudi Arabian Cultural Mission (SACM) in each host country. In 2015, the Ministry of Education and the Ministry of Higher Education were merged into one Ministry. Missions provide administrative support to KASP scholars during their program including program monitoring, academic mentoring and social support. SACM is responsible for transferring funds to host institutions and to individual scholarship recipients.

In the case of **Science without Borders**, two administering authorities existed including, CAPES (Ministry of Education) and CNPq, Ministry of Science Technology and Education with funding through the government of Brazil as well as private funding. Management of Science Without Borders was shared among two government agencies. CAPES was responsible for funding 40,000 scholarships and CNPq was responsible for funding 35,000 scholarships. Additionally, the government of Brazil hired the Institute for International Education to manage the program. As the program grew adjustments were necessary, as the number of Brazilian students who met the minimum English language requirements for admission was insufficient to keep up with the scholarship goals. One senior university administrator commented that coordinating program adjustments among multiple agencies and an implementing partner was difficult.

Participant’s returning obligations. Almost all scholarship recipients are expected to return upon completion of their program for a period of time that generally corresponds with the number of years they were provided scholarship support. Some scholars are expected to return to jobs they left and/or are placed in new positions in the public sector and/or in universities.

Scholarship participants in Kazakhstan’s program are required to pledge their homes as collateral against the value of the scholarship. Other countries have created positive incentives for return. China for example launched the “Thousand Talents Program,” creating incentives for study abroad students and scholars to return to China. These incentives for doctoral candidates included placement assistance, research funding and the construction of incubators to strengthen work environments.

¹³ Perna, LW., et al. “Understanding the programmatic and contextual forces that influence participation in a government-sponsored international student mobility program.” *Higher Education* 69, 2014, pp. 173-188.

KASP graduates have no returning obligation when they complete their program. Saudi nationals return to their country and until recently were easily able to find employment. The Saudi government hosts an annual job fair inviting recruiters to meet with recent KASP graduates. A Career Development Center was created at the SACM in the United States to provide KASP students with opportunities to learn additional practical skills and link students to future companies/careers.

Few programs are designed with re-entry support in mind. A 2014 study of 11 government sponsored programs found that there was a “general lack of effort spent on return and re-entry support.” (DAAD, 2014). In most cases scholars are expected to return home with little support for their transition. Designed well, alumni engagement, job training and career development programs can create positive incentives for return scholars and demonstrate a longer term commitment to strengthening national development and human capacity building.

Scholarship outreach efforts. Governments generally promote their scholarship programs on their website, at national conferences, in newspapers and through social media. Additional, outreach efforts on colleges and universities campuses in their respective countries is also a common practice.

Scholarship selection process. Applicants submit their materials electronically and are generally selected on the basis of an essay, transcript, minimum scores on the national secondary level exam, language proficiency, and standardized test scores required for admission to US universities, including the GRE. Scholarship recipients are generally selected in country through a selection committee and qualified applicants are interviewed on the basis of merit. Applications for those who make it past the selection committee are then shared with Cultural Missions in each host country or with an implementing partner who works with the Ministry on placement. Staff at missions or at implementing partners are responsible for recommending universities that align with the background and interests of the scholarship recipient.

Integrated Individual Scholarship/Institutional Strengthening Programs

Included in our analysis were two USAID-funded programs that involved significant doctoral-level scholarship support: the **Innovative Agriculture Research Initiative (iAGRI)** and the **Borlaug Higher Education Agricultural Research and Development (BHEARD) Program**. These programs focused on strengthening institutions and individuals in an integrated fashion.

The Innovative Agricultural Research Initiative (iAGRI). The goal of this initiative was to achieve food security in Tanzania by preparing the next generation of agricultural scientists, leaders, entrepreneurs, and knowledge-generating institutions. The program aimed to strengthen training and research capacities of Sokoine University of Agriculture (SUA) and the Ministry of Agriculture, Food Security, and Cooperatives. It did so by providing advanced-degree training in agriculture and nutrition for 135 Tanzanian graduate students; establishing a program of collaborative research on agriculture and nutrition; and strengthening the capacity of SUA to develop and implement instructional, internship, and outreach programs.

Of note about this program is that it was a holistic approach to strengthening the capacity of the university, improving university administration, strengthening teaching and curriculum across the university, and enhancing private sector engagement with the university.

The goal of iAGRI’s long-term training component was to equip the next generation of Tanzanian researchers and managers with skills and knowledge for achieving food security throughout the country. Their objective was to have 20 PhD, 108 MSc, and 3 BSc either enrolled in degree programs or graduated. As of October 2014, iAGRI had supported 131 trainees.

Approach to training. Both Tanzanian and US advisors guide the research of each Masters and PhD trainee based on a set of shared priority research projects. Research grants were awarded to joint teams from SUA and the US partner institutions. Students had faculty co-advisors to help increase the relevance of the joint research and the long-term impact of research output.

Support for candidates. For those scholars who were already employed, salaries were paid while they undertook their studies and their positions were guaranteed upon completion of the training program. English language training was paid for and an English Language Center was developed. A consortium of APLU universities was established (without the involvement of APLU, the Association) and all those in the consortium agreed to charge in-state tuition only. All tuition, fees, books allowances, computers, airfare and living expenses were covered by the scholarship.

Program support for iAGRI included campus coordinators to manage individuals on campus with full-time program management of 70 students per program manager. Students were placed by Ohio State University throughout the The Ohio State University Consortium (OSUC) – six US land grant universities, including Ohio State University (the lead institution), Michigan State University, Virginia Tech, University of Florida, Tuskegee University, and Iowa State University. Program payments for students were handled through Ohio State University.

Institutional Performance Improvement. In addition to supporting scholarships for advanced training, the iAGRI project also entailed a “Leadership for Change Management” initiative to transform SUA into a 21st century university where teaching, research and outreach are demand-driven. SUA’s Quality Assurance and Promotion Bureau partnered with the iAGRI project on a set of institutional performance improvement initiatives including a University Teaching and Learning Improvement program for instructors, a pilot program to utilize postgraduate students as Teaching Assistants, equipping classrooms with audio-visual equipment, and the creation of a Classroom Services Unit to monitor and maintain classroom equipment and facilities.

Other capacity-building activities iAGRI supported included a mentoring program for faculty and students, strategic planning for SUA’s alumni association, a web portal for the Sokoine National Agricultural Library to search for and download scientific papers, development of a statistics laboratory to advise students and academic staff on research design and analysis, curricular and equipment improvements for a remedial English language program, and short courses on various topics.

iAGRI also helped the Sokoine University Graduate Entrepreneurs’ Cooperative Organization (SUGECO) develop a strategic plan, providing a manager for SUGECO, packaging iAGRI post-graduate student theses as an “investment portfolio” to be marketed to food system firms seeking applied scientific knowledge for investment and operations, brokering public-private partnerships between SUA and agribusiness firms, and providing technical assistance to the horticulture industry in Tanzania.

The Borlaug Higher Education Agricultural Research and Development (BHEARD) Program. Launched in 2012, the BHEARD program is designed to increase the number of agricultural scientists and strengthen scientific institutions in developing countries. It supports long-term training of agricultural researchers at the master’s and doctoral levels and links scientific and higher education communities in Feed the Future countries and the United States. The design of training programs is grounded in a strategic planning process facilitated in targeted research institutions. The BHEARD program focuses on training a cadre of BHEARD Fellows at the graduate level.

In its first year, the program supported the training of 23 Ph.D. and master’s candidates from four countries, and has grown since then to support approximately 170 scholars now studying at 22 US universities and seven institutions in Africa. The project’s budget has grown from \$7 million in 2012 to \$33 million in 2016.

Approach to training. The BHEARD program is implemented by Michigan State University, which coordinates the placement process through a competitive review process. Universities apply to host BHEARD fellows and fellows are placed based on preferences of trainees and the strengths of the respective institutions.

Support for candidates. MSU coordinates all aspects of student placement at the appropriate universities, including providing advice on options for English language training, advice on preparation for and timing of GRE and TOEFL examinations, managing the admission process, arrangements for students to travel to the training site, and preparation of sub-agreements with universities where candidates will be placed. USAID missions facilitate the in-country visa application steps, medical examinations, and other pre-departure arrangements, with assistance from MSU in contacting the students.

During the academic training phase, MSU monitors and supports university training program implementation, provide guidance to mentors on how to support the students, and monitor the progress of candidates in their degree programs.

Both of these initiatives are examples of programs that support all aspects of a student's training as well as provide support for institutional capacity building.

Section 3 – APLU Assessment of Program Goals and Strategies with Recommendations

Based on all the above assumptions, understandings, and knowledge of the context, APLU has the following recommendations for the Government of Pakistan regarding the goals of the program. These recommendations regarding goals have important implications for decision-making about the options for structuring a scholarship program, which are discussed in Section 4.

Recommendations on Aligning Program with Articulated Goals:

Take an integrated approach leveraging individual training for institutional performance improvement.

The desire for the program to enhance the quality and number of faculty, the quality of the higher education institutions *and* to develop collaborations between Pakistani and US institutions would suggest that a program that focuses on institutional collaboration and that provides doctoral study scholarships as part of that collaboration would yield greater impact across the [four goals](#) that HEC has articulated for the program. The desire for the program to create opportunities for collaborative research projects “focused on Pakistani needs” and of benefit to both countries would similarly encourage a scholarship program that is integrated into a broader institutional partnership-building strategy. Institutional collaboration would also help to meet the objective of enhancing the ability of universities in Pakistan to engage the private sector in research and commercialization of research. An institutionally-focused approach could help to attract private sector attention and resources to the program.

HEC’s focus on the expansion of Tier I and Tier II institutions would also suggest that a scholarship program should not take a simple generalized “best and brightest” approach across an entire sector, but instead should focus on building certain programs and institutions. APLU has understood through conversations with HEC, with individuals familiar with Pakistan’s higher education system both in the United States and in Pakistan, that the quality of doctoral programs in Pakistan needs significant improvement. Given that Pakistan wishes to significantly expand the university sector over time, it will need high-quality, home-grown PhD programs to supply the pipeline of faculty needed, as the costs of overseas study are high. A goal of this scholarship program could, therefore, be to develop such doctoral programs in Pakistan. This would mean that the scholarship program should be developed in a more targeted way to build high quality doctoral programs in Pakistan to enable Pakistan to reach its long-term goals for expanding higher education in the country.

Another reason to take a more targeted institutional approach relates to the high cost of a US doctoral education. Among all regions of the world, the costs of education in the United States are very high. APLU understands that the reason the Government of Pakistan is willing to invest in this high-cost education is because it is expected to generate a high return compared to producing more faculty through other avenues. Based on this understanding, if a high-cost investment is going to be made for a scholarship program, such an approach should be consistent all the way through from start to finish to maximize the impact of these scholars upon their return. **In order to build expertise to enhance the technical and professional capacity of Tier I research universities to do world class research that will make Pakistan a hub of scholarly productivity it is critical to have a strategy for how and where returning scholars will be integrated or reintegrated into well-resourced institutions.**

APLU recommends the following for consideration regarding how best to maximize the impact of returning scholars:

- **Develop a plan for concentrating top talent and supporting them in well-resourced institutions.** To make the most use out of the best scholars, institutions need to be ready to support them. A return strategy that attempts to spread scholars across too many institutions may not yield the kind of institution-building goals that are articulated. It may be better to develop plans with universities – or at least use university development plans to target areas of focus for the scholarship. A return strategy will of course impact the outreach strategy for the scholarship program.
- **Consider further prioritizing the fields of focus to build excellence in a set of areas.** HEC’s current list of priority fields, and all the disciplines associated with the fields, is rather comprehensive, leaving few “non-priority” areas. There also appears to be some inconsistencies across the various documentation about the priorities, but APLU understands this was because some documents were in draft form and changes were made later. There may not necessarily be a need to further prioritize the fields of focus if an institutional approach is taken instead or if programs are targeted for enhancement across a set of institutions. If such an approach were to guide the scholarship program’s priorities for recruitment then the priority fields could simply be a starting point in that process.
- **Ensure that returning scholars wind up in roles they are suited for.** Not all returning faculty will have an interest in taking on leadership roles in their institutions, as department heads or new program directors. For some scholars, the potential to become the lead person to establish a new program could hold tremendous appeal and provide a strong incentive to return. Some faculty, however, have no interest in such leadership roles and wish instead to focus on their teaching and research program. Universities need both kinds of scholars to achieve excellence. Creating multiple pathways for returning faculty, or supporting top faculty with strong administrative support to develop new programs can ensure that the investment in talent development yields the highest institutional returns.
- **Give additional attention to the administrative support required for building up research programs.** PhD training will provide scholars exposure to all the administrative infrastructure that surrounds high-intensity research universities in the United States. But mostly, faculty are beneficiaries of this infrastructure and do not receive through the doctoral education, training in how one would build this infrastructure if it did not exist, or manage it. Therefore upon return, it would not be a good investment of human resources to put faculty in positions of responsibility for both leading research agendas and at the same time setting up the infrastructure that would be needed to support grant management, etc. Therefore HEC should have a clear strategy on how best to support the administrative side of research - grant management, fundraising, etc. Collaboration with US universities can also assist in supporting administrative infrastructure development.
- **Utilize the concept of action plans** as discussed in Section 2, to focus scholars on the institutional needs of Pakistan upon return. Preparing trainees to have an impact on their home institutions is an effort that should be undertaken throughout the life of a program – not just after the period of training. Actions for boosting post-training impact on institutional strengthening should be built into a program’s core and should be taken before training begins, during training, and after trainees have returned home.

-
- **Consider cluster hiring upon return.** Faculty cluster hiring is an emerging practice in higher education and involves hiring multiple scholars within a short time frame into one or more departments based on shared interests. These interests may be in research topics or in teaching areas where faculty can collaborate to be more effective problem solvers and educators. Some cluster hiring programs also aim to increase faculty diversity or address other aspects of institutional excellence.

Cluster hiring programs have the potential to improve institutional excellence by breaking down silos, attracting innovative, nontraditional scholars, and building peer groups that are needed for excellence in research. If faculty feel isolated from peers their productivity and impact can suffer and retention can be diminished. In the United States cluster hiring has been used to:

- Strengthen departments that are not keeping up. Some departments grow stale over time, especially if they've shrunk by attrition over the years. When a department gets too backwards-looking, bringing in a single new person is unlikely to matter much. Bringing in a clearly-defined new cohort, though, can bring innovative ideas and energy to a department.
 - Develop expertise in particular subject matter areas through interdisciplinary and multidisciplinary hires. Most big problems facing society are multidisciplinary in nature. To make contributions to solving them requires universities to have research and teaching programs that focus on these big challenges. For example, given Pakistan's focus on addressing energy challenges, it may require faculty who work in electrical engineering, economics, regional and urban planning and computer science. Therefore, a cluster hiring program would focus on bringing new faculty to an institution with specific expectations to work on energy challenges.
 - Address imbalances of representation of minority and women faculty. Hiring in clusters to address diversity issues can create a more supportive environment for the new hires.
 - Provide collegueship and reduce isolation of new faculty. Having a cohort can lessen the sense of isolation of new and younger faculty. Cluster hiring can assist in retaining faculty by providing focus and collegueship as they establish their teaching and research careers.
- Additional recommendations regarding good practices for supporting returning scholars can be found in Section 6.

Start small, scale up to meet the broader goals for Pakistan's higher education sector

As discussed in Section 1, APLU assumes that the Government of Pakistan prioritizes quality over quantity with regard to this program. The implications of this prioritization are that the program should: provide access to a high quality education for scholarship recipients; develop research capacity that is relevant to Pakistan; and deliver a high return on investment, which requires a high return rate and productive use of returning scholars. In order to ensure these results, APLU recommends that the program start small and scale up to ensure quality over time. This is important for several reasons:

- US universities are interested in high quality students for their doctoral programs and will be more willing to cost-share in the program if they experience a steady pipeline of quality students coming through the program. They will also be more willing to make accommodations if the program is perceived to be well-managed. Any negative perceptions in the first few years of the program will have ripple effects over time. Positive experiences will lead to greater interest over time.

-
- The potential pipeline of applicants to the program will also be affected by perceptions of quality. Scholars will communicate to other potential applicants their experience. If scholars do not feel adequately supported during the program or upon return, this will deter potential future applicants.
 - Therefore APLU strongly recommends starting off with smaller numbers to ensure a high quality program and scale up over time. This is likely to mean that the number of 10,000 is not likely to be reached in ten years given the current pipeline. In Section 1 APLU provides an analysis about the anticipated pipeline for the program that indicates the achievement of the 10,000 goal is not likely. APLU's assessment is that even the pilot-phase targets are not likely to be achieved and would advise a reduction of numbers to ensure the quality of the program. The numbers estimated by the pipeline analysis suggest that the program could potentially send 868 students by 2021.

By starting small also in terms of numbers of US universities hosting scholars, the HEC can focus on building the program with a few key partners and achieving cost-efficiencies with larger cohorts, and taking a more targeted, integrated approach as discussed above.

Integrate HEC's goals for improving the governance and administration of higher education into the program.

Although it is understood that this program is not intended to focus on improving the governance and administration of higher education given that other HEC programs are focused on that, the United States does have strength in the higher education administration field and offers EdD degrees that are becoming increasingly common as the credentials of senior administrative leadership in US higher education. While the PhD in education is directed toward aspiring researchers in education policy, the EdD is designed for leaders in a variety of organizational settings including colleges and universities, K-12 schools and senior leaders in ministries of education, and education-related multilateral and non-governmental organizations. The EdD program trains leaders to drive change in organizational settings and achieve large-scale improvements across educational systems through the strategic use of training in leadership, policy, innovation and assessment. APLU understands that this field is relatively small in Pakistan and supporting doctoral level training to include the EdD is recommended.

Give serious consideration to the value of training students in cohorts

APLU recommends structuring the scholarship program to send larger cohorts of students to fewer universities e.g. 100 – 150 to one institution over ten years rather than sending the same number of students to multiple institutions over the same time period. The larger cohorts of 20 – 30 students per year would probably mean students would enroll in different disciplines, but be present at a particular university at the same time.

Advantages of sending larger cohorts to universities include:

- **Better long-term relationship building.** If there are to be 150 students educated at one US university over a ten-year period, there would be approximately 20 – 30 students on the same campus at the same time. This cohort strategy would encourage the US university to develop a longer-term relationship with Pakistan for collaboration in teaching and research for years in the future. If only a few Pakistan students attend a US university, the incentive for longer-term relationship building would not be as strong. With many students from Pakistan, the US university campus level leadership could implement a university wide relationship with Pakistan which would not depend on only one discipline or department. In addition, with a larger alumni base, the US university's alumni association would more likely be supportive of Pakistan alumni given the larger

number educated at the US university. Therefore, academic and alumni support would likely be stronger if a larger cohort of students would study at each US university.

- **More efficient program administration.** Having more students at each university would make administration of the doctoral education program more efficient. A program coordinator that focuses on the particular needs of Pakistani students from this program could be a requirement of the grant agreement, which would also help to maximize efficiency, provide better services to the students, and develop supplemental programming as needed at minimal cost.
- **Stronger support network during and after study.** Larger cohorts would also allow students from Pakistan to better support each other in the US during their adjustment to new academic and social cultures. This network of Pakistan students working together would allow more support for family members if they choose to go to the US as well. These networks that would develop at each US university would also allow Pakistan faculty to continue collaboration and networking with each other back in Pakistan when they return. These networks of faculty who have returned from doctoral study in the US can provide important contacts for academic and social support which affect faculty satisfaction and feelings of being connected versus isolated upon return. This has an impact on decisions to stay or leave Pakistan institutions.

Find ways to further align the scholarship program with HEC's goals for enhancing IT-embedded teaching and learning into the program.

The use of technology in teaching and learning, and in higher education administration, is a significant part of the future of higher education – and education at all levels. HEC's 8th priority for its Vision 2025 – IT embedded higher education – will be strengthened if faculty sent to the United States are trained in technology-based learning. This scholarship program should consider having their scholars/students learn how to use technology in the classroom to enable higher education in Pakistan to capitalize on the benefits of technology-enhanced education. HEC might consider even targeting technology-based learning as a focus of doctoral-level study (either PhD or EdD), and using the scholarship program to build a Pakistani-based doctoral program in technology-based education. It is clear that these skills will be increasingly important in reaching larger number of students in Pakistan and improving the quality of teaching. Integrating technology into the classroom is important for all higher education institutions not only in those universities offering distance education. Many universities are finding teaching basic courses through technology, allowing students to learn at their own pace, is an effective and cost-efficient way to teach these courses.

Consider supporting EdD, MFA/MS and MA degrees when those degrees are the terminal degree in the field

In the design and textile fields, stated priority areas for Pakistan, the terminal degree is not always a PhD but could be a Masters of Fine Arts (MFA) or MA/MS. Therefore, the program should not limit itself to supporting PhD level training in the design and textile fields. As discussed above with regard to education policy and management, APLU also recommends including the EdD as an eligible degree for the program.

Section 4 – Key Considerations for Implementing the Scholarship Program

This section looks at some key considerations for a scholarship program, no matter how it is structured, regarding 1) outreach and preparation, 2) student placement and support during the program, and 3) support for returning students. The following section - Section 5 - looks at four possible approaches to structuring the scholarship program. The recommendations below would generally apply regardless of how HEC eventually chooses to structure the program.

Considerations regarding outreach and preparation of students

Recruitment

HEC's recruitment strategy should clearly align with the programmatic goals of the US-Pakistan Knowledge Corridor. Once the end goals of the program are firmly established the program can then determine the appropriate recruitment strategy. If a more integrated approach is taken for this program the recruitment strategy would look different than if the program is a traditional sector wide "best and brightest" approach.

Clearly articulating the particular advantages of earning a US doctorate degree should also be built into the recruiting and outreach strategy. Given that historically it has been difficult to attract Pakistani scholars to choose the United States for doctoral study due to the GRE requirement and the overall length of time to obtain a US doctorate compared to others, creating rewards that are unique to US doctoral study, will be important for recruitment. In its interviews with HEC staff and faculty familiar with the program, it was not clear to APLU what particular advantages there would be for a student to choose this more demanding path to PhD training over other options. If graduates of less rigorous/arduous PhD programs would gain the same advantages as those returning with a US doctorate there will be little incentive for pursuing this program and it may lead to students choosing this option because they intend to stay in the United States long-term (perhaps not meeting their return obligation at all, or leaving shortly after completing their five-year requirement).

Specific recruitment strategies include:

- Work with USEFP to identify returning MA Fulbright candidates who may be interested in doctoral study and careers in the academy. The Fulbright program supports candidates for Master's degrees in the United States on an annual basis. These students are not eligible to apply for a Fulbright scholarship at the doctoral level. These scholars have already received graduate training in the United States and may be interested in pursuing careers in the academy in Pakistan and furthering their academic study in the United States. Furthermore, they may need fewer than five years of scholarship support as they have already completed graduate work in the United States. HEC will need to be cautious in recruiting returning Master's students from the United States that they are not simply seeking a way to spend more time in the United States with the intention of staying. Some evaluation of the student's interest in pursuing a career in academia (and in Pakistan) should be part of the evaluation of scholarship applications.
- Provide additional GRE support and pre-academic training to those who were not selected for doctoral study through the Fulbright Program. In 2016 there were 485 applications for 50

awards for doctoral study. USEFP estimates that among the pool of students not selected, there were as many as 350 students who could be successful for doctoral placement with additional GRE and TOEFL preparation support and/or support with their application. These individuals could be targeted for additional support.

- Recruit MAs trained through ongoing investments in the Centers for Advanced Studies in energy, water and food security. These individuals have also had exposure to advanced research facilities and a culture of transparency in research. They have also developed their analytical skills through the MA program.
- Adjust the timeline for recruitment to an 18 month cycle to allow enough time for preparation and placement. The scholarship selection process established by HEC should follow USEFP process/timeline for Fulbright and move to a fifteen month recruiting/selection/placement process as follows:

Scholarship Application Deadline:	May
Selection:	September
Interview:	October
Decision:	November
Placement:	through February
Visa Interviews:	through June/July
Departure:	August

- Work with US universities to develop an outreach strategy for existing Pakistani BA and MA candidates studying in the United States and with the Pakistani diaspora community to provide them with information regarding the scholarship program.
- Recruit through traditional mechanisms in Pakistan including newspapers, social media, and a robust website.
- Engage faculty who have returned from a US doctoral program in the recruiting process.
- Engage the Pakistani diaspora community in the United States to help identify talented Pakistani students in the United States completing BA and/or MA degrees who may have an interest in building the future of tertiary education in Pakistan.
- Consider the following changes to eligibility criteria for this program including:
 - Allow BA/BS from US accredited University with a minimum of 16 years of education an opportunity to apply. Candidates for doctoral program in the United States are often selected with BA degrees rather than with MA degrees. Candidates who have received rigorous undergraduate training in the United States, in Pakistan, or elsewhere may be interested in pursuing the doctoral program and this change in the eligibility criteria would support their candidacy.
 - Increase the age of award eligibility to 45 for regular faculty members and researchers of public sector universities/R&D organizations, subject to NOC issuance and for all others maximum age of 35 at the time of the closing date of application submission. One of the stated goals of the program is to increase the percentage of faculty working at universities with advanced degrees. Raising the age of award recipients would create a broader pool of applicants for consideration.

-
- Lower from 10 years to 5-7 years the number of years of continual employment required for current faculty to be eligible to apply for the program and be guaranteed their job upon return. Currently, ten years of continual employment service is required in order for faculty to retain their jobs at the university should they choose to apply for doctoral study. Lowering the years of continual employment will broaden the pool of candidates and potentially create a longer-term human capital investment by training younger qualified existing faculty.
 - For faculty who already have teaching positions, consider paying some portion of exiting salaries while they are studying overseas so that there is no loss in income during the period of degree attainment. Even if the degree earner can earn more money after the degree is obtained, incurring income loss during the program may be a strong disincentive.

Talent Farming

HEC's development of a "Talent Farming" program to prepare the pipeline of students to receive a scholarship is a critically important foundation piece. It is both useful as a marketing tool for the scholarship program and as a way to prepare students for success.

The goal of HEC's Talent Farming Program is to train a total of 6000 candidates in the pilot phase of the program between 2018-2021. In August, HEC and the U.S Educational Foundation of Pakistan (USEFP) entered into an agreement to offer Talent Farming Conferences and workshops for those interested in applying for the doctoral scholarship program. Under this agreement, in years one and two 1,000 candidates will be trained annually and in years three and four 2,000 candidates will be trained annually. The costs associated with the program include screening tests to identify the pool of candidates, marketing and training materials, cost of the trainers as well as the cost of the TOEFL and GRE/GMAT exam. In the first call for GRE training, 5,157 applications were received between October 23-November 4, 2016. USEFP and HEC have developed a set of criteria for shortlisting the list of eligible candidates based on stated diversity goals.

In the initial workshops, interest by region varied with limited response from the center in Quetta and pending approval of financial arrangements in Peshawar. USEFP and HEC are both committed to further outreach efforts in these regions designed to maximize regional diversity.

As the program is currently structured, candidates are short-listed for the orientation sessions, workshops and 5 week training. In 2016, 800 students participated in the orientation sessions, 800 in the workshops and 200 in the 5 week training across four centers. Those in the 50 hour training program are provided with mock testing and writing support. Those who complete the five week training program are provided with funding to complete the TOEFL, GRE and GMAT.

APLU recommends the following for consideration regarding further development of the Talent Farming program:

- APLU believes that to significantly increase the numbers of students to undertake doctoral training in the United States, preparation will require more than GRE and TOEFL test preparation. Students will likely need support in developing their applications, writing their statement of purpose, English language training, training in how to be successful in a US PhD program, and how to best prosper in a US academic environment. It is important, for example, to understand expectations about students being proactive in reaching out to professors with questions or needed assistance, and rules around academic plagiarism and the consequences of

violating those rules. This additional preparation support will be critical to increasing the number of successful candidates. HEC should expect to invest more in candidate preparation in order to send large numbers of students.

- Recruitment for the talent farming should reflect the priorities that the Government of Pakistan has for diversification of participation, prioritization of disciplinary areas, etc. Thinking about these goals from the recruitment stage is critical to achieving those goals. Regarding gender parity or geographic diversity, more needs to be done than a statement “encouraging” certain groups to apply. Active outreach to certain demographic groups will yield better results. Engaging female faculty and other underrepresented groups to recruit a diverse pool is also a good strategy.

Appropriate visa for this program

International students on government sponsored programs and enrolled full-time as degree seeking students at US accredited colleges and universities apply for either a J1 or F1 visa. Government sponsored programs that require students to return to their home country typically require scholars to apply for a J1 visa. Students on J1 visas must return to their home country within 30 days of completing their program of study. They are not eligible to stay in the United States for Optional Practical Training.

APLU recommends that HEC government sponsored students should apply for J1 visas.

- Scholars must first be admitted to a university before the school is able to begin processing the immigration work. If scholars are applying for a J-1 visa they will need to be issued the DS-2019 immigration document before they can apply for the visa at the US Embassy or Consulate in Pakistan.
- To receive immigration documents scholars generally need to submit their enrollment deposit and submit forms necessary to demonstrate financial ability to pay for at least one year of tuition, fees and living expenses.
- The university will then issue the DS-2019 document to scholar or the sponsoring agency.
- Before applying for the J-1 visa, all first time J-1 visa applicants are required to pay the SEVIS FEE in addition to the visa application fee.
- After scholars/sponsors receive their immigration documents, scholars will need to apply at the US Embassy or Consulate in Pakistan for their J-1 visa.
- J-1 visas are only issued to students and scholars when their financial sponsor or exchange program requires that they study on a J-1 visa.
- A new F-1 or J-1 visa can only be acquired at a US Embassy or Consulate outside the United States. It is not possible to renew a visa by mail or in person within the United States. Every US Embassy has different visa application procedures; most now require appointments for visa processing.
- Anyone applying for an F-1 or J-1 visa must "prove" to the satisfaction of the Consular Officer that he or she does not intend to immigrate to the US It is important to bring supporting documents to provide evidence of an intent to return to the home country such as: proof of family ties, ownership of property in the home country, a job in the home country, or HEC could provide a copy of the bond agreement.

2. Considerations regarding student placement in US doctoral programs and support during academic training

It is important to understand the unique admissions process for doctoral study in the United States and also to understand the landscape of US higher education to make determinations about appropriate placement of students and what US institutions should be considered eligible for the scholarship program.

Understanding the US doctoral admissions process

Admission decisions to doctoral programs in the United State vary across individual institutional types and within individual institutions. Decisions are made by a number of different stakeholders on campus, including deans, faculty and staff at the individual schools and colleges and through centralized decision-making processes. Admission decisions are often made by one set of stakeholders while financial aid decisions scholarship decisions are made by a different set of individuals. Those who have the positional authority to negotiate preferential admission and financial aid policies for admitted students various across individual institutions, where the process is decentralized at the graduate level, and by institutional type. Negotiation of policies that are designed to support and ease preferential admissions and financial aid for admitted students are most feasible at institutions where a centralized admission system exists.¹⁴ Negotiated agreements with each school/college and/or university and/or consortia of universities in support of sponsored students requires an understanding of the graduate enrollment landscape and requires staffing in support of this effort.

The value of investing in student placement

Given the ambitious numeric targets the Government wishes to achieve and the limitations that exist in the pipeline, it is **strongly recommended to invest in the placement of students**. Scholarship programs with high quality placement services as part of the process lead to better admissions outcomes due to greater fit for purpose between students and their academic program hosts. A student placement mechanism can also allow HEC to better leverage its resources supporting the large scale placement of students at both high cost and low cost universities across the United States. A student placement mechanism will help to build trust in the program and the quality of students that come through it, which will facilitate the management of the program over time. Students will be better served because they will receive appropriate guidance on programs that suit their academic interests and it will help to remove some of the barriers involved in seeking admission to US universities, including the high costs associated with applying to multiple universities. Placement services may also include ensuring a student's admissions file is complete and includes transcripts, letters of recommendation, standardized tests and language proficiency test scores. Placement services generally provide students with any information on the requirements for renewing the award as well as on maintaining academic progress reports for the sponsoring organization.

Eligible US institutions for HEC scholars

For the pilot phase of the program, HEC created a list of 200 institutions in the United States where scholarship recipients, if admissible, would be eligible to receive the award. HEC developed the list on the basis of QS rankings and land-grant status. While the QS ranking quantifies some elements of

¹⁴ Helms, Robin, et al. "Internationalizing Higher Education Worldwide: National Policies and Programs." *American Council on Education*, 2015, www.acenet.edu/news-room/Documents/National-Policies-and-Programs-Part-1-Global.pdf.

research output, it is not an accurate reflection of the quality of doctoral programs in the United States, nor, in fact, is the status of land-grant a designation of quality assessment.

It is recommended instead that HEC use the [Carnegie Classification of Institutions of Higher Education](#) as the basis for selecting eligible universities and allow for the placement of scholars in Research 1 and Research 2 universities. This system provides a framework for classifying colleges and universities in the United States based on their research activity. Doctoral universities are assigned to one of three categories based on a measure of research activity. The research activity scale includes the following data: research & development (R&D) expenditures in science and engineering; R&D expenditures in non-Science and Engineering (S&E) fields; S&E research staff (postdoctoral appointees and other non-faculty research staff with doctorates); doctoral conferrals in humanities fields, in social science fields, in STEM (science, technology, engineering, and mathematics) fields, and in other fields (e.g., business, education, public policy, social work).

These data are combined to create two indices of research activity reflecting the total variation across all of these measures.

Research 1 (R1) universities are labeled Doctoral Highest Research Activity. Institutions were included in this category if they awarded at least 20 research/scholarship doctorates in 2013-14 and had the highest total and per faculty research activity. There are 115 universities in this category.

Research 2 (R2) universities are labeled Doctoral High Research Activity. Universities were included in this category if they awarded at least 20 research/scholarships doctorates in 2013-14. These R2 universities had the next highest level of research activity. There are 107 universities in this category.

A list of these institutions is included in Appendix D (in Excel format).

Build in opportunities to conduct research in Pakistan during dissertation period

To ensure doctoral candidates are undertaking research that is relevant to Pakistan and that can be continued when scholars return to Pakistan, we recommend a program of study that allows scholars the option of returning to Pakistan in year four of their study to conduct research with faculty from both the United States and Pakistan, either jointly supervised or not. Students would return to the United States in year five to complete their project and finalize writing their dissertations. This time back in Pakistan could also be used to interact with higher education institutions and develop collegiality to make the student's final return more productive and give incentive for the PhD student to return and not go to another country. Such an approach would allow scholars an opportunity to develop a joint research agenda with faculty in Pakistan who may be willing to support their candidacy for hiring and provide them with the technological resources they need when they begin their careers at universities in Pakistan. It would also help to strengthen the ties between the host university and the institutions to which the scholars will return. The utility of this year of in-country dissertation research will depend on the fields of study and the particular dissertation research project, so this recommendation will need to be reviewed on a case-by-case basis.

Set up a competitive fund for dissertation research

Some students, particularly in certain fields, will be able to do their dissertation research under a grant of a faculty member at the host university. But in other fields, it is more rare for doctoral students' dissertation research expenses to be funded by a grant that the university already has. There are a variety of sources of potential funding for dissertation research, but in the United States the majority of these sources restrict eligibility to compete for these funds to US citizens. It will be probably be even

more difficult for students from Pakistan to find US sources of funds for doing dissertation research in Pakistan.

Given the importance for returning to Pakistan for research development and the difficulty students from Pakistan may have obtaining funds for dissertation research, it is recommended that Pakistan establish a competitive fund for dissertation research, some of which can be used to return to Pakistan to develop the research topic and obtain data. This fund should be competitive as only well-developed proposals should be funded to assure PhD students are going to do important research of good quality for Pakistan. Funds could be used for international and domestic travel, survey costs, obtaining and developing data and other necessary research development activities. Typically, dissertation research grants are relatively small.

Considerations regarding incentive structures, job placement, and support for returning students

As one of the goals of this program is to strengthen the quality of higher education institutions in Pakistan, it is essential to consider HEC policies that will motivate students to return to Pakistan upon completion of their doctoral studies and that will support them to have the greatest impact on their institutions upon return, not just for the five year minimum required service but over a long academic career. As one faculty member stated in regards to the scholarship program, “Brain drain is not the problem, we want to make sure we don’t put the brain in the drain when they return.” Creating an institutional environment that attracts and retains outstanding scholars is conducive to productive and engaging teaching and research and needs to be prioritized.

There are many “pull factors” that would incentivize outstanding doctoral candidates to stay in the United States particularly in the STEM fields. In 2013, 41.6 percent of international students enrolled in the United States were enrolled in STEM fields and one-third of all STEM Ph.D.’s awarded were awarded to international students.¹⁵ The US government has pursued policies to expand optional practical training for STEM students in order to help the United States meet workforce needs. According to the National Science Foundation, over seven out of ten doctoral recipients with temporary visas intended to stay in the United States after earning their degrees.¹⁶

Public policy decisions in both countries will drive decisions made by HEC scholars and incentives must be considered to motivate graduates to return and strengthen institutions in Pakistan. Consistent with human capital theory, students will choose to apply for the program if the perceived benefits exceed the cost.¹⁷

In addition to the recommendations outlined in Section 3 regarding strategies to maximize impact upon return, this section provides some concrete recommendations regarding the incentive structure for returning faculty, job placement strategies, and resource support for returning faculty.

Incentive structure

APLU has understood from reviewing the documentation and speaking with HEC leadership that recent HEC policy has determined that all overseas doctoral degree holders will be hired at universities with a guaranteed salary of Level 19 in the new tenure track system. HEC has also established a competitive

¹⁵ Center for Migration Policy, 2013.

¹⁶ NSF, 2016.

¹⁷ Perna, Laura W. “Studying College Access and Choice: A Proposed Conceptual Model.” *Higher Education: Higher Education: Handbook of Theory and Research*, vol. 21, 2006, pp. 99-157. Print.

fund for research grants of up to 1 million rupees for returning faculty with doctorates from abroad. Given this universal policy, there is nothing that would incentivize choosing to pursue a US degree over a doctoral degree from another country. Given the longer length of time of a US PhD, this universal policy essentially provides a disincentive to pursue a US doctoral degree. As a result, people who pursue a US degree may be doing so because of the international marketability of the degree, which would not serve the goals of the program.

Incentives for HEC to consider might include:

- Hiring bonuses for US degree holders returning through the scholarship program
- Competitive research collaboration grant funding to support faculty to continue to engage collaboratively with the US institution where they did their training.
- Increased levels of research and international conference attendance funding for US doctorates.
- Enhanced administrative and/or research support for US doctorate holders. At a minimum, there should be a system in place (it may already exist or is in development) for faculty to be released from teaching in exchange for attracting research funding or taking on administrative responsibilities.
- Engage returning faculty on national efforts to improve curricula or to integrate technology into teaching and learning, in exchange for course releases. This would provide incentives to the scholars and also help to enhance system-wide impacts from overseas training.
- Create incentives within the pay system, including a faster pace of advancement, perhaps once the five-year obligation is met to incentivize retention of faculty in the long-term.
- Finally, the return requirements of the J-1 visa will also be important for encouraging return, as will the bonding agreement between the scholar recipient and HEC.

Job placement

- As discussed in Section 3, APLU recommends that HEC take a more integrated institution-building approach which would suggest more of an alignment of training with university strategic plans to develop certain programs. This would mean that rather than students returning and competing on the job market along with everyone else that academic year, the entire scholarship program would be developed and coordinated with concrete plans for building out certain programs. This would provide returning faculty with collegiality and a sense of being part of something bigger. Open competition should remain a part of the process. However, some resources within HEC could be used to support the alignment and coordination between university strategic plans and scholarship training.
- In the absence of a more targeted effort, the current system of one-year of HEC funding to support new hires (the Interim Placement of Fresh PhDs program - IPFP) seems to function well to incentivize institutions to hire new PhDs. However, the IPFP program does not incentivize hiring a foreign PhD over a domestic one. We heard from one returning faculty member that hiring committees tend to favor hiring individuals who are known to them rather than supporting the candidacy of a foreign-trained PhD who may introduce new methodologies and practices. The IPFP program could be adjusted to provide stronger incentives to hire foreign-trained PhDs.
- Over the course of the training, there could be support for students to engage with departments and programs in Pakistan so that they are more easily integrated upon return. The

recommendation of sending students back in the fourth year to develop research topics will also provide a time for these students to learn more about which university they might best be suited for and begin to make plans on returning to Pakistan rather than go to other countries.

Institutional support and resources

- Develop repatriation workshops to help students manage some of the difficulties of returning from a US system to Pakistan. These workshops can help to strengthen the network among scholars and can help to give faculty good advice on strategies for reintegration.
- Nurture networking among faculty who return via virtual platforms where information can be shared among returnees. This is particularly useful to ease the transition in the first year or two after returning. HEC may discover these networks will get created entirely on their own, in which case there would be little need to support the network.
- Provide financial support to returning scholars for engaging more globally through travel and conference grants, payment of journal publication fees, payment for access to global data banks and support for interacting with global experts in their fields.
- Establish a process to apply for reduced teaching loads for faculty who are actively engaged in research or in program development and administration.
- Institutions could be incentivized to hire returning scholars by also supporting funding for administrative and/or research support for faculty. If HEC could centrally fund such support, an institution would gain a top level faculty member as well as funding for administrative support for the faculty member.
- Establish a mentorship program along the lines described in Section 2 of this report (see Follow up After Training Ends).

Section 5 – Overview of Program Implementation Options

According to a recent report by the American Council on Education evaluating national scholarship programs and policies, clarity of purpose is critical for success.¹⁸ Clarity of purpose allows the sponsor to identify clear metrics for monitoring progress and evaluating impact. A critical issue related to clarity of purpose is whether the primary goal is to support *individual* career advancement, or *institutional* capacity strengthening. The metrics for these two end goals are substantially different.¹⁹ APLU's evaluation of options and recommendations are made with the **assumption that the Government of Pakistan places institutional capacity strengthening as the primary goal of this program**. The different options below are evaluated through that lens. Section 1 discusses in more detail the assumptions APLU made about the prioritization of goals for this program, which have guided the recommendations in this report.

The ACE report also highlighted two other characteristics in common across successful scholarship programs: commitment and flexibility.²⁰ Commitment of resources to ensure the program's sustainability is critical given the long-term nature of doctoral study. Finally, flexibility is necessary to realign the program with a wide-range of developments that naturally occur over the course of the implementation period.

APLU's assessment of these options is made with these three good practice principles in mind - clarity of purpose, commitment and flexibility.

APLU has identified four options for structuring the scholarship program. Each of these options requires substantially different approaches to allocating funding for the program. They are not all necessarily mutually exclusive. HEC may wish to offer multiple pathways for access to the scholarship. The options are to:

1. Negotiate agreements with US universities to admit cohorts of students, with Pakistan providing grants for graduate assistantships and research.
2. Provide grants through existing and/or newly establish Centers for Advanced Studies with US partner universities.
3. Provide "return grants" to students who gain admission to US universities with an assistantship provided by the host university.
4. Provide scholarships funds directly to students.

¹⁸ American Council on Education, 2015. *Internationalizing Higher Education Worldwide: National Policies and Programs*.

¹⁹ Metrics for impact on individuals include employability in their selected field of study, changing attitudes and perceptions regarding the host country, the development of cultural empathy, their ability to influence future policies. Metrics for impact on institutions include number of students and/or faculty trained, number of faculty holding advanced degrees, research output, impact on curriculum and partnership development, as well as the advancement of institutional rankings, enrollment and diversity goals.

²⁰ ACE, 2015.

This section provides an overview of each option, with a discussion of the merits and implementation requirements for each, and concludes with APLU’s recommendation regarding which combination of pathways would be best.

Option 1. Provide “research and assistantship grants” to US universities

This option would entail negotiating agreements with a set of US institutions to host cohorts of students, and providing funding directly to the US institutions in the form of student assistantships and research grants. The university agreements would set terms about numbers of students to be admitted and the conditions of admission per dollar amount of grant funding provided. This option is not a typical approach to a scholarship program. APLU believes this innovative approach could serve well the goals that the Government of Pakistan has articulated for the scholarship program.

The concept was developed with the purpose of seeking cost-savings through economies of scale and to put in place incentives for US universities to support research relevant to Pakistan, utilizing and further developing the research capacity of Pakistani scholars.

The concept was also developed with the knowledge that large numbers of doctoral students in the United States are supported through research assistantships, teaching assistantships, or graduate assistantships, which often come with full or substantial tuition waivers and a living stipend. Knowing this, the premise of the “research and assistantship grant” option is that since many US programs already assume the costs of assistantships with tuition waivers for PhD students, if an outside sponsor were to cover some portion of the cost, this would provide an incentive to choose a Pakistani scholar over another applicant who did not bring any external support.

The research and assistantship grant model would operate as follows:

- The US institution would receive a grant of some amount to be determined in the negotiation. This report provides information on the range of grant funding that would be required to make this model work at most of the public Research 1 and Research 2 universities in the United States.
- In exchange for this grant, the university would create an assistantship position that could only be filled by a Pakistani scholar that was admissible to the university per the university’s standard requirements.
- The assistantship position would include a monthly living stipend for the student, health insurance, and a substantial tuition waiver.
- The remainder of the grant can be used as needed by the institution in support of the program and the student’s research.
- The amount of the research grant would be calculated on a per-student basis and multiplied by the number of students admitted and enrolled. For example, for every \$31,000 per year, one student could receive an assistantship, health insurance and research support; therefore if 5 students were admitted, the university would receive \$155,000 in funding per year. The exact amount would vary by institution, based on their costs of attendance and what was negotiated with HEC. Payment for the five years of study could be allocated upfront, or not in this model.

Advantages of the Model

- It allows for scaling up the numbers of students that can potentially be hosted and the creation of a “program” on campus to serve the students coming through this mechanism – even if students are scattered across many departments.
- It allows Pakistan to work with fewer US universities which can substantially reduced transactions costs of placing a large number of PhD students.
- This option also provides an opportunity for Pakistan students to develop a network among themselves for mutual support while at the same university. This network might also be helpful if families accompany any of the students.
- As a result, the university will have more opportunities to target resources in support of services to support the students and faculty research supervision.
- It also incentivizes the faculty to take an interest in Pakistan and in research that is relevant to Pakistan.
- Such an approach has the potential to create more lasting institutional linkages that will benefit higher education in Pakistan (and in the United States).
- Finally, this model would require a student placement mechanism (either third party or at HEC) that handles recruitment and vetting of students; and guidance to students about which of the universities in the eventual network of universities that have signed agreements is the right fit (placement services). Having a good placement mechanism is both a requirement of this model, and an advantage of this model. Scholarship programs with high quality placement services as part of the process, lead to better admissions outcomes due to greater fit for purpose between students and their academic program hosts. A student placement mechanism may also allow HEC to better leverage its resources supporting the large scale placement of students at both high cost and low cost universities across the United States.

Considerations for the Model

- This model would require significant time spent on negotiating agreements with each university, even after creating a general template of an agreement outlining the model – each university will need to make their own adaptations to the agreement to make it work. So there is some upfront cost and effort required to creating these programs. But the potential for scaling up seems to merit that upfront investment.
- This model would also benefit from some support for institutional linkages. Building on the Centers of Excellence will be easier, for example, than starting with no institutional partnership with any institutions in Pakistan. There is so much to be gained from tying individual scholarships to institutional partnerships.

APLU assessed the feasibility of implementing the HEC scholarship program through this “research and assistantship grant” model by reaching out to a sample of 13 public, private and land grant universities to discuss the model and to seek specific feedback on the funding requirements to make the model viable. The feedback from this assessment is detailed in Section 6.

Option 2. Work through Centers for Advanced Studies to expand PhD training.

Another approach would be to align the scholarship program with HEC's plans to fund more Centers for Advanced Studies and to include doctoral study in support of building the Centers. This approach could be adopted rather easily by starting with the Centers that already have partnerships with US institutions. The key difference between this approach and the research grant model, is that the focus of the program is on strengthening or building new programs at Pakistani universities in a more holistic partnership with a US institution. Doctoral study becomes, then, just a piece of an overall institutional strengthening partnership.

The Center for Water at Mehran University of Engineering and Technology, Jamshoro, in partnership with University of Utah and the Centers for Energy at National University of Science and Technology, Islamabad, and University of Engineering and Technology, Peshawar, in partnership with Arizona State University, and the Center for Agriculture/Food Security at University of Agriculture, Faisalabad, in partnership with University of California Davis could be expanded to include doctoral training and to develop indigenous doctoral programs in the fields of energy and water and food security. Others could be established to cover other areas of focus, or particular specializations within these areas, given that energy, water and food security are critical priorities for Pakistan.

Under this model, research faculty at the Centers for Advanced Studies in Pakistan could work with graduates of their M.A programs to develop a research proposal on topics of interest to institutions in Pakistan. During their doctoral training they could return to Pakistan in year four to conduct jointly supervised research.

Advantages of the Model

This model would be the closest to what the literature on leveraging individual training for institutional capacity strengthening would suggest. Focusing on partnerships with US universities for the purposes of strengthening overall programs and institutions would allow for leveraging of multiple investments.

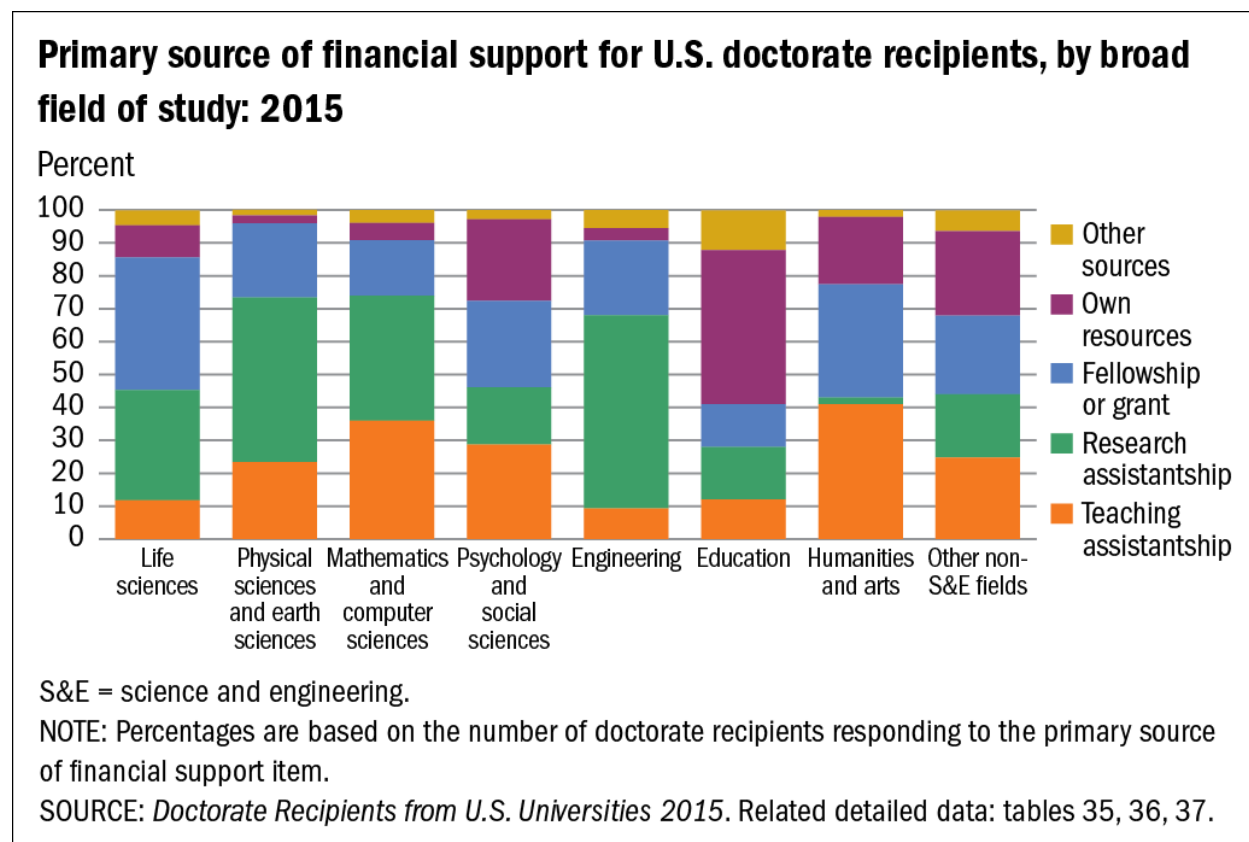
It would also create a relationship between institutions where the US partner would have better knowledge about the quality of students and could create a lasting pipeline of students – recognizing which Masters students should be targeted for PhD training and better understanding the needs of the institution.

Considerations for the Model

- Overall this approach would require a higher level of investment - drawing on the resources that would have been allocated to the development of new Centers for Advanced Studies. If this option were to be adopted and a large number of Pakistani faculty were to be educated to the doctoral level in a variety of fields, new Centers for Advances Studies would need to be developed.
- The model should expand the training options by using a consortium approach similar to the approach used in the BHEARD and iAGRI programs discussed in Section 2.
- In addition , if this doctoral education program would be administered by each Center for Advanced Studies, that would require several administrative units be involved in PhD education preparedness, placement, support while studying and return process implementation, with a central administrative unit supporting the network.

Option 3. Invest in student preparation and provide “return grants” to successful students

The US university system is organized in such a way that there is a substantial amount of funding, coming from different sources, available to support doctoral training. Bachelors and Masters level training in the United States do not benefit in the same way from this structure of financial support. Below is an overview of the primary sources of support for US Doctorate recipients by broad field of study in 2015.



With significant variation across fields of study, there are indeed significant opportunities for students to obtain financial support for their doctoral studies in the form of research or teaching assistantships (which are citizenship-blind) and fellowships (most of which are accessible only to US citizens because the vast majority of fellowships are sponsored by the US government). Appendix F in this report provides detailed information regarding assistantship funding at three sample universities.

Therefore the Government of Pakistan may wish to capitalize on this system of assistantship funding for doctoral studies and seek to increase the number of Pakistani students obtaining admission with an assistantship. However, such an approach would require a rather different model of funding than a traditional scholarship program for several reasons:

1. If a student from Pakistan is competitive enough to obtain admission with an assistantship, what incentive would that student have to seek to bond themselves to HEC for a minor additional level of scholarship support (such as airfare, or a relatively small amount of funding upon return)?
2. To achieve a higher acceptance rate in US universities, a program seeking to support Pakistan students would require investments on the front end – student preparation to be competitive in

the doctoral application process – and on the back end – a generous package to incentive the return of highly competitive students.

3. Given the high level of competition for assistantship funding, this approach would also likely yield a much smaller number of successful students who would be accepted overall. It is important to note, too, that teaching assistantships often require higher levels of English language fluency than research assistantships at most institutions. Some universities have set very high language proficiency standards for their teaching assistantship positions.

Advantages of the Model

- This model takes advantage of funding that already exists for doctoral study in the United States.
- Rather than bonding students, this approach would focus on incentivizing return, a more motivational approach to the same end, and puts more funding into the return of scholars than any of the other models.
- This approach ensures that students are in doctoral programs with faculty that have personally chosen them among a highly competitive pool.

Considerations for the Model

- This model would likely yield the smallest number of placements.
- Many students receive assistantships because they are already known to the US faculty, having studied or interacted with them at the master's or bachelor's level.
- Doctoral research conducted may not be relevant to Pakistan and scholars may not be able to continue their research in Pakistan.
- This model would not generate a very large cost-savings because the package to incentivize return would need to be substantial, in effect replacing the cost of supporting the degree training. Furthermore, the investment in preparation of students for gaining admission would also be substantial. HEC would need to provide considerable preparatory support and could wind up investing in many students who don't succeed in gaining admission.

Option 4. Provide scholarships funds directly to students.

The fourth option would be to establish a more traditional scholarship program, funding the students directly, and supporting their application process, placement process and return. It could entail a similar process to what took place in the first year of HEC's pilot phase, with HEC negotiating on behalf of students who gain admission without an assistantship for some form of tuition waiver. This approach would undoubtedly yield some tuition waivers as it did the first time around. Such an approach would benefit from having the appropriate human resources in place to negotiate on behalf of students.

Advantages of the Model

- Students who gain admission to doctoral programs may do so with no funding and/ or with limited funding. This approach may allow HEC to provide variable levels of financial support to students who are admissible to doctoral programs but were not able to secure any or enough funding.

-
- If the application and placement process were to be designed to be similar to the Fulbright doctoral application process, the HEC scholarship program could serve to help students navigate the US doctoral application process and facilitate placement of well qualified students through a network of US institutions.

Considerations for the Model

- A scholarship program of this kind – which resembles a more straightforward “best and brightest” model – may not deliver the kind of institutional strengthening outcomes that the Government of Pakistan has expressed as a goal of the program.
- Students who wind up getting a significant tuition waiver and or assistantship from a US university may not feel as indebted (and bonded) to HEC as those who aren’t able to obtain that supplementary financial support.
- At scale, such a scholarship program would require significant human resources on an annual basis negotiating on behalf of each individual student with a large number of universities. There would not be many opportunities for achieving any economies of scale.
- This model would benefit from a high-quality student placement services unit.

APLU Recommendation on Combination of Options for Optimal Results

APLU recommends combining two of the above options to provide two pathways for HEC-supported doctoral study in the United States. **The recommendation is to pursue Option 1 - the “research and assistantship grant” model – and combine this with Option 3 - financial support upon return to students who gain admission with an assistantship (covering full tuition with a stipend) on their own to a US university.** Consideration would need to be given to whether to offer a similar package of financial support to students who obtain the Fulbright scholarship.

APLU believes the second option of working through the Centers of Excellence is a very good option to consider as well, with many clear benefits. APLU assumes, however, that this option may deviate too much from the original concept for the scholarship program and therefore may not be of interest to the Government of Pakistan to pursue at this stage.

The next section – Section 6 – will provide some detailed information and guidance on how to proceed with APLU’s recommendation of establishing the program using the first option, research grants to US universities in combination with the third, providing return grants to students who gain admission with an assistantship on their own.

Section 6 – Detailed Program Implementation Recommendations for the Research Grant Model

As discussed in Section 4 above, among four possible options to structure the program, APLU recommends that HEC pursue the approach whereby HEC would give grants to US universities in exchange for creating assistantship positions that could only be filled by Pakistani scholars that were admissible to the university per the university's standard requirements. APLU believes this model aligns best with the goals of the Government of Pakistan and could achieve the greatest cost-efficiencies at scale while creating lasting linkages with US institutions for the benefit of Pakistan.

This section provides some detailed guidance on how to implement such a program. This guidance has been developed on the basis of a thorough exploration of this model with a set of US universities (public (non-land-grant), private and land-grant) that represent a range of institutional types and cost levels. The section begins with an overview of the feedback received from the US universities consulted about this approach.

Summary of US University Feedback on the Research and Assistantship Grant Model

APLU spoke with administrators from approximately 20 universities over the course of the feasibility study. These institutions represented a broad range of institutional types. Generally, consultations with the universities took place with senior international administrators or with senior administrators with knowledge about government-sponsored graduate programs, academic and programmatic support for doctoral students, and/or admissions processes.

In addition, a more formal survey was conducted to seek feedback on the research and assistantship grant model being proposed and on the specific financial numbers this model would require to make it viable at each of the institutions consulted. In this survey, the universities were all given the same sample budget to adjust as needed to make the proposal viable for their institution. The sample budget provided in the survey was built using figures that reflect the per student allocation that was approved in the PK-1 documentation provided by HEC. The budget reflected:

- a grant to the university of \$22,500 per year per student for five years to fund an assistantship position
- a requirement to waive tuition for each assistantship offered and provide each student:
 - a stipend of \$1475 per month
 - and cover health insurance, indirect costs and administrative costs from this grant.

The ten universities that responded to the survey by email and or in person were:

1. American University
2. Mississippi State University
3. Rutgers University
4. Southern Illinois University
5. State University of New York system
6. University of California at Davis

-
7. University of Missouri
 8. University of Illinois at Urbana Champaign
 9. University of South Florida
 10. University of Utah

The information below summarizes the feedback received through the formal survey and from other unstructured interviews with universities in which this model and other scholarship models were discussed. In response to the survey, not all universities answered each question or gave firm responses to what might be accepted regarding financial assistance for enrollment of scholarship students. Of the ten respondents, we received specific responses about financial arrangements from seven. It is important to understand that all responses we received are only indicative and not firm commitments from these universities. The information below is therefore provided without attribution:

- The universities consulted found the model to be innovative and in some cases, they had a difficult time understanding the model because it was unfamiliar and quite different from other scholarship programs. Clearly articulating the approach is key to generating US university interest in the program. Several universities responded by asking why a program that would require a larger university cost-share than income would be of interest and declined to provide additional feedback because of lack of interest.
 - There was general agreement that with the right level of funding, it could stimulate some interest in the graduate school encouraging faculty to engage with the program. What universities found of interest was the possibility of using resources from the grant model to support joint research and cooperation among institutions in Pakistan. In their responses, they were keenly interested in this model as both a human capital development model and an institutional capacity building model.
 - More than 85% of those universities who responded indicated the level of \$22,500/year/student was too low for them to give serious consideration to supporting government sponsored students from Pakistan. Doctoral admissions decisions are made by faculty who generally are seeking the very best students; therefore, small levels of funding will generate minimal influence on that decision making process.
 - The range of acceptable levels of funding per year per student reported was:
 - \$22,500 - 1 respondent
 - \$26,000 - 1 respondent
 - \$30,000 - 2 respondents
 - \$34,000 - 1 respondent
 - \$36,000 - 1 respondent
 - \$40,000 - 1 respondent
 - The majority of universities indicated that the funding per student required would vary depending on which departments were of interest, as some program costs are significantly more than others. If a cohort of students were spread across multiple departments, costs could be balanced across the group.
 - The average level of financial support indicated by all who responded was \$30,785 per year per student.
-

-
- Two items that seemed to give universities the most concern were the living allowance of \$1475 per month and the stipulation that no funds could be utilized to cover the cost of tuition.
 - Living allowance:
 - The living allowance in some cases was below the legal limit allowed in the State, or simply was not deemed to be sufficient to cover actual living expenses.
 - As noted earlier in this report, APLU undertook a separate analysis of living costs across 11 universities.²¹ The mean annual living costs from these 11 universities was \$20,250 per student. The median of this data was \$18,700. The range of these data was from \$14,500 – \$33,874 per student annually. This information is also summarized in Appendix E.
 - Tuition:
 - Regarding utilization of grant funding to cover tuition, the majority of respondents expressed that flexibility regarding the use of funds, once basic requirements of the assistantship are met, would be important so that any funding could be allocated as needed per department and institution in support of the program.
 - Each university is unique in their financial assistance policies and how these are applied. Universities can be more accommodating to ensuring the cost of attendance for each student is covered if they have some flexibility in how they may use funds. For example, some universities must use some of the funds for tuition, if they cannot discount tuition levels substantially. Therefore, it would be beneficial to both the HEC and each university to develop an agreement for financial support that allows flexibility with certain constraints.
 - Since the funding under this model would be provided in the form of a grant, universities would also need a statement in the agreement about any restrictions on the amount of overhead they are able to charge. Universities are able to lower overhead provided there is a negotiated rate between the university and the sponsor. All of the universities consulted expressed that some overhead would need to be covered.
 - Several respondents expressed that receiving multiple years of funding at once would help to attract the university's interest in the program. In other words, if the annual grant were to be \$31,000 per student, receiving the cost over five years up front (\$155,000) would make the grant much more attractive. It would attract attention to the program in a way that a year-by-year payment would not. A higher profile for the program can lead to more institutional resources being devoted, and will serve to attract the interest of more senior faculty, and more faculty overall to the program.

²¹ A survey was taken of eleven US universities regarding the costs of living for a year for a doctoral international student. These costs included room, board, books, health insurance and transportation expenses. No tuition or related fees were included in these costs. None of these costs included expenses for families who might accompany the student. Graduate school admission offices require documentation that students can pay these costs as a part of the graduate school application process. The universities surveyed were: Arizona State University, Michigan State University, Mississippi State University, Ohio State University, Purdue University, New York University, Southern Illinois University, University of California at Davis, University of Illinois at Urbana Champaign, University of Utah, and Wayne State University.

Budget Scenarios for Implementation of the Model

With these responses in mind three budget scenarios were developed. These scenarios, included in Appendix G (in Excel format), provide funding scenarios for the scholarship program at various levels and reflect the fact that the Government of Pakistan may proceed with its desire not to cover tuition costs. Each of these scenarios assumes the following:

- The program budget is fixed at the original capital cost of 18.8 million RS over the 96 month period.
- The projected enrollment target for the pilot phase is 868 students.
- All contingency costs in the Summary of Capital Costs have been rolled into the program development costs line item. If allowable, these program funds could be utilized in support of other recommendations in this analysis.
- The living allowance of \$1475 per month has been increased to \$1500 per month in scenarios one and two and \$1600 per month in scenario three.
- The cost of living allowance is a twelve month allowance in each scenario.
- PhD Talent Farming costs remain fixed in each scenario. While we recommend additional academic preparation, which will increase the Talent Farming costs, we assumed these additional costs could be covered by the program development resources.
- Project management costs have been adjusted in each scenario to reflect the appropriate level of staffing.
- Each scenario has a Summary of Capital Costs outlining the percentage of the budget dedicated to scholarship, talent farming, operational costs, and program development.

Scenario One

The first scenario calculates scholarship expenses through a grant to universities of \$23,300. This represents an increase of \$800 over the original proposed budget of \$22,500 per year. It also assumes:

- No tuition support
- An increase in the cost of living allowance for each scholar to \$1500 per month for 12 months for a total of \$18,000 per year.
- Scholarship costs also include health insurance, a settlement fee and a roundtrip airline ticket.
- The settlement fee and roundtrip airline ticket are paid directly to the student.
- Operational costs have increased to 4.83% of budget to reflect staff and resource recommendations.
- All other operational costs are consistent with the original HEC Phase I budget model.
- Program development costs are available to support recommendations.

Scenario Two

The second scenario calculates scholarship expenses through a grant to universities of \$31,300 per year. This represents an increase of \$8,800 over the original model of \$22,500. The model is designed for negotiating agreements with lower-cost-of-attendance universities. It also assumes:

-
- Tuition is calculated at the rate of \$4,000 per semester x two semesters per year x 5 years.
 - An increase in the cost of living allowance for each scholar to \$1500 per month for 12 months for a total of \$18,000 per year.
 - Scholarship costs also include health insurance, a settlement fee and a roundtrip airline ticket.
 - The settlement fee and roundtrip airline ticket are paid directly to the student.
 - Operational costs have increased to 4.83% of budget to reflect staff and resource recommendations.
 - All other operating costs are consistent with the original HEC Phase I budget model
 - Program development costs are available in support of recommendations.

Scenario Three

The third scenario calculates scholarship expenses through a grant to universities of \$37,700 per year. This represents an increase of \$15,200 over the original model of \$22,500. The model is designed for negotiating agreements with higher-cost-of-attendance universities. It also assumes the following:

- Tuition is calculated at the rate of \$7,000 per semester x two semesters per year x 5 years
- An increase in the cost of living allowance of \$1600 per month for 12 months for a total of \$19,200 per year.
- Scholarship costs also include health insurance, a settlement fee and a roundtrip airline ticket.
- The settlement fee and the roundtrip airline ticket are paid directly to the student.
- Operational costs have increased to 4.83% of budget to reflect staff and resource recommendations.
- All other operating costs are consistent with the original HEC Phase I budget model
- Program development costs are available in support of recommendations

Key Recommendations

1. Invest more per student

A top-line recommendation is that HEC should expect to spend more per student than currently anticipated. It may be possible to establish a program at some US institutions for the scholarship amount allocated in the first year of the program – the equivalent of \$114,000 US for five years – but this will be at institutions that are currently experiencing enrollment challenges and are likely struggling more than most to attract talent. The reason to expect to spend more is not just to cover the real costs at the top schools, but also to ensure that the program/research focus is targeted to the needs of Pakistan. Spending more per student means that the program will be one that US universities find attractive and will seek to compete to be a part of. This will yield better outcomes overall. It will generate faculty interest and investment of time into Pakistan-related research issues, driven by the presence of students and research funding that directs attention in that direction. Additional grant resources will also attract the interest of departments who have their choice of good students, not only departments who need students to fulfill their research and teaching needs.

2. Invest in the upfront negotiation of grant agreements

Negotiating agreements requires an understanding of the admissions criteria and processes as well as the levels of support for doctoral education and supervision at the respective institutions. These negotiations will be more successful if the persons engaged in negotiating for HEC understands the US graduate school landscape well, and the opportunities as well as constraints for negotiating tuition-related adjustments. Determining what flexibility faculty and institutions have to waive tuition, negotiate in-state tuition and lower indirect costs is necessary and this requires approaching institutions on a case-by-case basis or negotiating agreements through a research consortium framework. HEC could send some scholars to low cost of attendance schools and some to high cost of attendance schools and adjust the numbers accordingly to achieve the maximum cost savings and impact.

3. Start with a small number of university agreements

Aim to start with 8-12 university agreements with institutions able to accommodate a larger number of students in priority disciplines. Work to ensure the academic success and social integration of students through site visits over a two to three year period before expanding the number of institutional arrangements.

4. Make the process competitive among US universities

Make the process of selecting the universities a competitive one. One good option for developing agreements is to ask universities to respond to a Request for Proposals (RFP) from HEC (or HEC could outsource that task to a third party). In that RFP, HEC would outline the necessary requirements for a university to participate in the scholarship program, the benefits to participation, the basic parameters for funding and student support, the expectations for a longer-term relationship, the expectation for research to be Pakistan relevant and the likely number of students that would be covered by the agreement. The responses to this RFP would allow HEC to understand how the US university would be able to develop the program and subsequent relationship building. Then, the GoP would be able to choose among those universities who responded the best fits for students. In addition, these US university proposals would be a good starting point for negotiating financial and academic terms for the program. That would lessen the time needed in negotiation of the final agreement because the basic requirements of the program and a financial budget would be outlined before final negotiations would start. This approach is also discussed in the Management Options section below.

5. Consider front-loading the funding

If the GoP could provide funds for the program upfront, with stipulations about what happens if students drop out etc, this would allow universities to use these funds more effectively over time. One reality of PhD education is that more funds are often needed early in the student's program than later. This is because later years, the tuition might be less than in earlier years given fewer courses are taken. Having upfront money can assist the university in planning expenditures more effectively over time. US universities have strict accounting rules and regulations so upfront money will be spent on the activities specified in the agreements. The agreement, furthermore, should require reporting on expenditures to the sponsor – the GoP.

Therefore, providing money upfront does not mean the GoP would lose control of what expenditures are being made.

6. Minimally constrain use of funds and years of funding.

To minimize costs overall, it would be important to be approach the negotiation of agreements with flexibility on how the scholarship funds can be allocated. Each institution has restrictions on cost-sharing and/or tuition discounting and flexibility in other areas. Many of the US universities that Pakistan-funded scholars would be attending are public institutions. In the United States, these public universities are state institutions and therefore have to abide by the laws of their respective states. Some states have regulations about what a university can and cannot do in negotiating agreements. Therefore, it is essential that the agreements developed with US universities be able to accommodate these differing state laws and regulations. For example, some states may have to charge some tuition or education costs. Some may not be able to negotiate in-state tuition rather than international student tuition. Almost all private universities can negotiate lower tuition levels than what is published; this is not necessarily the case for public universities. It is best to make certain the US university understands what Pakistan wants done financially and then let the university find the way to do that which covers what is requested by Pakistan.

Possible Supplemental Pathway

As discussed at the conclusion of Section 5, the grant model could be accompanied by an alternate pathway for students to obtain HEC support, giving students two different options for obtaining financial support for their doctoral education.

Some of the very best students could potentially gain admission on their own to a US university and obtain an assistantship. If so, HEC could instead of a scholarship provide upfront assistance with gaining admission (GRE prep; navigating the US doctoral system prep, etc.) and a large grant upon return to Pakistan equivalent to the cost of the scholarship they could have had plus what others get upon return. This option would assist the GoP to retain these good students. If there are good financial and institutional benefits to returning to Pakistan for these good students, they are much more likely to do so. Without some incentives to return these students would be more likely to take positions with institutions outside Pakistan. This option is important as one desire is to have the very best faculty return to Pakistan and build their careers and institutions there.

Program Management

Developing, implementing and managing sponsored student scholarship programs requires a great deal of collaboration among the sponsoring government, colleges and universities and the individual student. To ensure a seamless experience for students, a clear understanding of roles and responsibilities among all parties is necessary as well as clearly established mechanisms for communication. Depending on the scale and complexity of the program, governments will invest in staffing within their own Ministries and embassies, and/or choose to outsource student scholarship program management to a partnering organization. The partnering organization could be the university/college receiving the students and/or a separate program management organization. Deciding which administrative approach to take is often driven by internal capacity and expertise within the sponsoring Ministry, the duration, size and complexity of the program, and by the administrative costs associated with managing and implementing the sponsored student program.

Principles of good sponsored student management practice suggest that when outlining roles and responsibilities among parties, the following tasks must be assigned:

- Define the goals, objectives and degree levels of education and ensure adequate funding is provided in support of these objectives;
- Establish metrics for measuring success using verifiable baseline data;
- Develop guidelines and program policies for sponsored students, establishing requirements for maintain the scholarship and maintaining good academic standing, program completion requirements, limitations on the duration of funding and policies for dependents and families if applicable;
- Establish criteria and procedures for the selection of sponsored students;
- Develop outreach plan;
- Negotiate terms of the scholarship with host institutions when additional support is requested;
- Evaluate candidates and select students for participation including in-person interviews;
- Provide placement of sponsored students in the appropriate academic programs and provide timely transfer of documents to host institutions for enrollment and visas;
- Develop pre-departure orientation including and re-entry programs in preparation for degree study at the hosting institution and career advising upon re-entry;
- Provide students with adequate accident and health insurance while enrolled in the scholarship program;
- Communicate with students and establish contacts at host institutions regarding placement of students, those with authority to negotiate terms and conditions and those in positions to support the administration of the sponsored student award and conditions;
- Provide timely transfer of documentation and funds to the host institution directly, or through an implementing partner;
- Monitor progress of the students throughout their degree program to ensure they are making sufficient academic progress, maintaining legal immigration status and complying with appropriate tax laws;
- Evaluate progress of students in the program and make adjustments as needed;
- Support and manage student advisors whose functions include:
 - Serving as the main point of contact for participants with their host institution and sponsoring agency.
 - Coordinating the timely submission of admissions material, and documentation necessary for visa processing, registration and billing. Plans orientation programs and materials for scholarship recipients as needed.
 - Submitting all documentation to the host institution and monitor progress on grants/contracts to ensure timely payments and compliance on term of the agreement.
 - Monitoring academic and overall progress on scholarship recipients, and preparing financial reports to sponsoring organization to ensure program compliance. Serves as a resource to

participants during the course of their program and serves as a resource during emergencies and in managing disputes.

- Managing scholarship data in a Client Relationship Management System hosted by a third party or created/maintained by Ministry.
- Caseloads for student advisors vary depending on complexity of the program, age of students, and the length of program. The ratio of students to program advisor can vary from program to program and may also depend on the advisor's job description and overall responsibilities.

Importance of investing in the operational costs associated with program management

Regardless of whether HEC chooses to outsource any of the management tasks, it is important to have staffing in place to support the functions outlined above. The current PC-1 scholarship budget shows operational costs equal to 1.36% of total program costs. Given the complexities of managing a program of this size and an interest in ensuring the successful long-term outcomes of this investment, APLU recommends hiring additional staff and resources in support of this initiative, increasing operational costs to 4.83% of the total program cost. APLU's staffing and resource recommendations include the following additions to, and for, the US-based program management team:

It is recommended that HEC invest in a senior level administrator to negotiate agreements in support of this program and to support the placement of scholars. The model of negotiating agreements between HEC and universities in support of students is labor intensive and requires a subject matter expert in graduate enrollment management and with an understanding of the enrollment management process in both centralized and decentralized admissions and financial aid systems. This individual would be responsible for developing cost-sharing arrangements between HEC and partner institutions ensuring the cost of attendance for each doctoral candidate are covered. The administrator would also be responsible for leveraging resources in support of candidates at both low-cost and high-cost of attendance institutions while ensuring that candidates were placed at institutions where their research interests aligned with those of their faculty supervisors ensuring quality supervision of their research and learning. Using a well developed statement of purpose, efforts would be made to place students at institutions where the qualifications, background and interests of the student match the enrollment criteria for the university, and the research interests of the faculty. Placement of students would also require staff support to upload admissions materials on behalf of students, manage timely communication and process visas and payments.

It is recommended that HEC invest in student placement and student advising services to support their functions outlined above. The ratio of scholars to student advisors we would recommend is a maximum of 200:1 based on best practices. This would mean hiring one student advisor in year one and two, two in year three, three in year four, and four in year five.

It is recommended that HEC invest in management technology in support of this program. A CRM (customer relationship management system) would enhance the review of applications and be necessary for the placement management of students. It will also support reporting and analytics for the program.

It is recommended that HEC invest more resources in its current human resource allocation for staff in the United States. The salaries of the existing position in the budget for a program coordinator and an accountant may be insufficient to yield a candidate with significant experience in the field.

It is recommended that HEC invest more resources in travel, marketing and outreach. The current budget provides \$8000 per year for US office expenses including local travel. In order for HEC to

promote this program to US colleges and universities additional marketing and outreach dollars should be provided to attend national and international education conferences where senior international officers, deans, provosts and governments from around the world converge to share opportunities for collaboration. These conferences include AIEA, Education USA, NAFSA, and annual association meetings. Additional travel funds would also allow student advisors to obtain training at conferences and conduct site visits to universities as needed.

At a minimum, we recommend increasing operational costs for the program management investments as outline above by a minimum of \$550,000 in year one. This amount would be adjusted in each subsequent year reflecting the number of staff necessary to support student services. These figures have been adjusted by five percent annually, consistent with HEC's cost adjustment for US salaries in their original budget. These costs are reflected in operational costs of the HEC budget under program administration in the US Project Management Unit.

Scholarship Management Recommendations

HEC could choose to manage the entire program or choose to outsource the program management responsibilities outline above. In all scenarios we recommend that HEC:

- Define the goals, objectives and degree levels of education and ensure adequate funding is provided in support of these objectives.
- Establish metrics for measuring success using verifiable baseline data.
- Develop guidelines and program policies for sponsored students, establishing requirements for maintain the scholarship and maintaining good academic standing, program completion requirements, limitations on the duration of funding and policies for dependents and families if applicable.
- Establish criteria and procedures for the selection of sponsored students.
- Develop outreach plan in Pakistan.
- Negotiate terms of the scholarship with host institutions when additional support is requested.

The remaining management tasks can either be performed by HEC, if they wish to manage the program fully, or by engaging with partners.

Options for outsourcing program management

Depending on the scale of the program, many sponsoring governments have chosen to work with implementing partners in the administration of these programs given the roles and responsibilities outlined above, number of institutions and complexity of communication at institutions, and the need to negotiate terms of agreements for individual students and to refine/clarify policies and procedures and terms of agreements, over the course of the scholarship period. Third party providers are also involved in convening university officials with the positional authority to negotiate these agreements, managing disputes, dispersing funds to students and host institutions.

Third Party Management Options:

There are two options for HEC to consider for outsourcing management:

1. Outsource select management functions for the duration of the program

HEC could choose to issue an RFP (Request for Proposal) or NOFO (Notice of Funding Opportunity) to the public for management tasks it chooses to outsource for this program. HEC would determine the parameters for the award and on the basis of established criteria, determine the selection of a third party provider. Several non-profit institutions in the United States have experience managing large-scale government sponsored programs including the American Councils for International Education, the Institute for International Education, IREX, and World Learning. Some of the major higher education associations, including APLU, could also provide these services.

Once an implementing partner is established, the partner could then run sub-grant competitions with US universities in support of these efforts. The third party provider would be responsible for managing the components of the scholarship HEC would like to outsource, as well as take on the responsibility for managing a competitive grant process with universities in support of HEC's efforts to support scholars and strengthen the higher education sector in Pakistan. The selection of universities would be made on established criteria that could include the strength of the institution and its academic programs, their commitment to sustaining institutional ties with scholars in Pakistan, and their ability to cost-share programmatic expenses.

2. Outsource select management functions for start-up period

HEC could choose to enter into a consulting agreement with a third-party provider to engage senior-level subject matter experts to train new and existing HEC staff, manage university partnerships and agreements and develop marketing and outreach strategies on behalf of HEC. The goal would be to fully transition these functions to HEC in year four.

Section 7 - Summary of Key Considerations and Recommendations

Section 2: Lessons Learned from Past Individual Training Programs

1. An overemphasis on the individual's training objective.
2. Institutional strengthening and training conceived as separate with little crossover leverage.
3. In programs with a clear focus on institutional strengthening, training is viewed as the driver to improve institutional performance.
4. Institutional needs assessments are often biased towards identifying gaps in human resources, and particularly technical knowledge
5. Minimal connection to home-country institutions.
6. Increasing but still limited attempts to build soft skills.
7. Action planning not generally integrated into training programs.
8. Mentoring can be better utilized as a tool for institutional capacity development.

Section 3 – Recommendation on Aligning Program with Articulated Goals

1. Take an integrated approach leveraging individual training for institutional performance improvement.

In order to build expertise to enhance the technical and professional capacity of Tier I research universities to do world class research that will make Pakistan a hub of scholarly productivity it is critical to have a strategy for how and where returning scholars will be integrated or reintegrated into well-resourced institutions.

- Develop a plan for concentrating top talent and supporting them in well-resourced institutions.
 - Consider further prioritizing the fields of focus to build excellence in a set of areas.
 - Ensure that returning scholars wind up in roles they are suited for.
 - Give additional attention to the administrative support required for building up research programs.
 - Utilize the concept of action plans
 - Consider cluster hiring upon return.
2. Start small, scale up to meet the broader goals for Pakistan's higher education sector.
 3. Give serious consideration to the value of training students in cohorts.
 4. Find ways to further align the scholarship program with HEC's goals for enhancing IT-embedded teaching and learning into the program.
 5. Consider supporting EdD, MFA/MS and MA degrees when those degrees are the terminal degree in the field.

Section 4 - Key Considerations for Implementing the Scholarship Program

Highlighted Recommendations:

- Invest in placement and advising services.
- Invest significantly more in the preparation of students, beyond GRE and TOEFL.
- Utilize action planning for HEC scholars.
- Change eligibility criteria for students.
- Adjust the timeline for recruitment to an 18-month cycle.
- Send students on a J-1 visa.
- Use Carnegie Classification to determine eligible host universities.
- Invest in support to returning students – think about incentives beyond the five-year obligation.
- Build in opportunities to conduct research in Pakistan during dissertation period.
- Set up a competitive fund for dissertation research.

Section 5 – Overview of Program Implementation Options

APLU recommends creating the scholarship program with two possible avenues for students to obtain support from HEC:

- Provide “research and assistantship grants” to US universities. This would involve negotiating agreements with a set of US institutions to host cohorts of students, and providing funding directly to the US institutions in the form of student assistantships and research grants.
- Offer a package of financial support to students who gain admission with an assistantship (covering full tuition with a stipend) on their own to a US university.

Section 6 - Detailed Program Implementation Recommendations for the Research Grant Model

1. Invest more per student
2. Invest in the upfront negotiation of grant agreements
3. Start with a small number of university agreements
4. Make the process competitive among US universities
5. Consider front-loading the funding
6. Minimally constrain use of funds and years of funding.

Program Management Recommendations

- **Important to adequately invest in the operational costs associated with program management**

The current PC-1 scholarship budget shows operational costs equal to 1.36% of total program costs. Given the complexities of managing a program of this size and an interest in ensuring the

successful long-term outcomes of this investment, APLU recommends hiring additional staff and resources in support of this initiative, increasing operational costs to 4.83% of the total program cost. APLU's staffing and resource recommendations include the following:

- Invest in a senior level administrator to negotiate agreements in support of this program and to support the placement of scholars.
 - Invest in student placement and student advising services to support their functions outlined above.
 - Invest in management technology in support of this program.
 - Invest more resources in its current human resource allocation for staff in the United States.
 - Invest more resources in travel, marketing and outreach.
- **Should HEC wish to outsource any of the program management tasks, two options could be considered:**
 - Outsource select management functions for the duration of the program
 - Outsource select management functions for start-up period

References

British Council and Deutscher Akademischer Austauschdienst (DAAD). "The rationale for sponsored students to undertake international study: An assessment of national student mobility scholarship programmes." *British Council*, 2014.

Helms, Robin, et al. "Internationalizing Higher Education Worldwide: National Policies and Programs." *American Council on Education*, 2015, www.acenet.edu/news-room/Documents/National-Policies-and-Programs-Part-1-Global.pdf. Web.

"History of the Program." *Bolashak International Scholarship - Center for International Programs*, 2013, bolashak.gov.kz/en/o-stipendii/istoriya-razvitiya.html. Accessed 2017. Web.

Khattak, Khalid. "Mapping Higher Education in Pakistan." *MIT Technology Review Pakistan*, 10 Feb. 2016, www.technologyreview.pk/mapping-higher-education-in-pakistan/. Accessed 2017. Web.

National Center for Education Statistics. "Average graduate tuition and required fees in degree-Granting postsecondary institutions, by control of institution and percentile of charges: 1989-90 through 2015-16." *National Center for Educational Statistics*, 2016, nces.ed.gov/programs/digest/d16/tables/dt16_330.50.asp. Web.

Okahana, Hironao, et al. "Graduate Enrollment and Degrees: 2005 to 2015." *Washington, DC: Council of Graduate Schools*, 2016, cgsnet.org/ckfinder/userfiles/files/Graduate%20Enrollment%20%20Degrees%20Fall%202015%20Final.pdf. Web.

"Open Doors 2016 Executive Summary." *IIE*, Nov. 2016, www.iie.org/en/Why-IIE/Announcements/2016-11-14-Open-Doors-Executive-Summary. Accessed 2017. Web.

Perna, Laura W. "Studying College Access and Choice: A Proposed Conceptual Model." *Higher Education: Higher Education: Handbook of Theory and Research*, vol. 21, 2006, pp. 99-157. Print.

Perna, Laura W., et al. "Understanding the programmatic and contextual forces that influence participation in a government-sponsored international student-mobility program." *Higher Education*, vol. 69, no. 2, Feb. 2015, pp. 173–188. Print.

Appendix A - Methodology

To determine the feasibility of the government of Pakistan's PhD scholarship program, APLU put together a diverse research team included experts in higher education, enrollment management, global education, and scholarships for overseas study. The team undertook a variety of research activities including:

- Reviews of Academic and Grey Literature – focused on identifying lessons learned from past assessments of scholarship programs and institutional capacity development efforts.
- Program Documentation Analysis – including a review of seven different government-sponsored scholarship programs; HEC documentation; the websites and public documents related to the USAID-funded Centers of Excellence
- Interviews with Key Stakeholders – including HEC leadership, USAID program staff, Pakistani faculty and returned HEC scholars, US public and private university senior international officers and graduate deans, and individuals with experience with government-sponsored scholarship programs on the receiving and sending end.
- Data Analysis – including analysis of HEC data, publicly available data on Pakistani GRE and TOEFL test takers, and data collected from US universities.

In the process of publications review and discussions with HEC leaders, there were key questions developed about how Pakistan scholars could be best supported in their study, based in part on best practices and lessons learned from those administering and supporting students from comparative government sponsored scholarship programs. Additionally, a survey was conducted with a sample of public and private universities to test the financial aid model proposed by HEC in support of this program.

Interviews were conducted with university administrators, government officials and implementing organizations supporting government sponsored students. To ascertain answers to questions about the financial feasibility of the scholarship program, a sample of US universities, who were on a preferred list given to the team by the HEC, was developed were surveyed. This sample consisted of 13 public and private and land-grant universities, large and smaller universities, higher and moderately ranked institutions and universities that had significant and little relationship with Pakistan. Each of these 13 institutions was sent a survey testing HEC's proposed financial model for the scholarship program. The team followed up with discussions with university senior international officers and deans, third-party sponsors and government officials involved in the administration of government-sponsored programs both in the US and in Pakistan to understand other key questions and best possible options for implementation and policy. Three team members traveled to Pakistan in August and met with a variety of public and private sector leaders, university faculty and administrators, NGO leaders and US Government agency people working in Pakistan.

A pipeline analysis was developed to understand how many students would successfully complete standardized testing in Pakistan each year and qualify for the HEC scholarship. Additionally, the team looked at completion and return rates to Pakistan to achieve the outcomes desired by the GoP and HEC.

As recommendations and perspectives were developed, many of these were checked with HEC leadership over the course of the report development.

Appendix B - Current HEC Priority Fields for Scholarship Program

“The major areas identified in consultation with academia, industry and other stakeholders are engineering technologies computer hardware, micro-electronics, Nano-technologies, material sciences, medical sciences and allied health advanced programs, social sciences, climate change, water resources and innovative programs in urban planning, arts and design, anthropology and sociology. The sub classification is as under:”

Agriculture and Veterinary Sciences

Agriculture

1. Bioplastic²²
2. Fodder for Animal²³
3. Vegetable Breeding²⁴
4. Date palm²⁵
5. Plant breeding and Genetic²⁶
6. Waste Management²⁷
7. Weed Science²⁸

Veterinary Sciences

1. Animal Production & Technology (Top priority: 40%)
2. Anatomy, Histology & Embryology
 - Meat Science & Technology
 - Animal Breeding & Genetics
 - Dairy Technology
 - Animal Nutrition
 - Leather & Fiber Technology

²² Because plastic is used in tunnel for mulching and also increase the value of wheat straw, rice straw etc.

²³ Developed varieties with agronomic traits also with some special important minerals like Golden rice.

²⁴ Very important field because mostly all the seed of vegetables are from foreign countries and the imported varieties are susceptible to fungal diseases and viruses. Secondly the issues is to develop/focus on parthenocarpic varieties.

²⁵ Breeding or development of local varieties that are uniform in different character which help in their processing also resistance to biotic stresses.

²⁶ Major focus on biometry and quantitative genetics now it's the main weak area.

²⁷ Due to plastic waste it is necessary to manage it.

²⁸ Control the weed by management without the use of herbicide e.g. use different cropping pattern

-
3. Veterinary Sciences (Top priority: 30%)
 - Microbiology
 - Parasitology
 - Pathology
 - Epidemiology & Public Health
 4. Basic Sciences (priority: 10%)
 - Pharmacology & toxicology
 - Physiology
 5. Life Sciences (priority: 10%)
 - Livestock Economics & Business Management
 6. Fisheries (priority: 10%)
 - Fisheries & Aquaculture
 - Marine and Freshwater culture (Both Finfish and Shell Fish)
 - Sea Food processing & Packaging
 - Sea weeds culturing & Marketing
 - Fish Stock assessment

Biological Sciences

1. Pharmaceutical, organic food
 - Bio desulphurization of coal
 - Bioleaching of ores
 - Livestock
 - Food processing industries and horticulture, long and extra-long cotton in coastal areas.
 - Marine resources and forest preservation
 - Promotion of biotech crops
 - Superior breeds of livestock
 - pharmaceutical and food industries
2. Food technology, natural Products, disease prevention in population
3. Mechanisms of intracellular membrane trafficking
4. Physiological regulation of the secretory pathway
5. Regulation of cell motility
6. Subcellular imaging
7. Biogenesis of organelles and membrane compartments

-
8. Programmed cell death
 9. Cell fate determination
 10. Embryonic development of multicellular animals
 11. Signal transduction and cytoskeletal organization
 12. Tissue morphogenesis
 13. Gene regulatory networks
 14. Early embryo patterning
 15. Evolutionary developmental biology
 16. Genomes and genomics

Chemistry

1. Chemical Kinetics
2. Chemical Thermodynamics
3. Electrochemistry
4. Biochemistry
5. Physical Chemistry
6. Solar Energy Conversion
7. thermochemistry

Computer Sciences

1. Algorithms And Computational Complexity
2. Applications Of Artificial Intelligence
3. Computational Biology
4. Computational Neuroscience
5. Computer Graphics
6. Computer Systems
7. Data Mining
8. Data Visualization
9. [Digital System Design](#)
10. Distributed Systems
11. Hardware Design and Implementation
12. [Introduction to Artificial Intelligence](#)
13. [Neurobionics](#)

-
14. Parallel Algorithms, Grid Computing
 15. Randomized Algorithms And Probabilistic Analysis
 16. Software Engineering
 17. Software for Embedded Systems
 18. The Hardware/software Interface
 19. Robotic + Cryptography
 20. Web Programming

Development Studies²⁹

1. Institutions, Governance and Development (P-III*)
 - Good Governance
 - Institutional Development
 - Unruly Politics
2. Poverty and underdevelopment (P-II)
 - Measurement of poverty, inequality and vulnerability
 - Food Security
3. Gender and Development (PI-I&IV)
 - Gender Mainstreaming
 - Politics of Implementing Gender and Development
4. Development Management (PI, II & III)
 - Feasibility studies
 - Development/program Planning
 - Project/program appraisal
 - Monitoring and evaluation
 - Impact Evaluation
5. Rights and Development (P-I, IV)
 - Food Rights
 - labor rights
 - Social Protection
 - Other rights - Education, health, water...
6. Public Services Delivery (P-I, II & IV)

²⁹ Goals are grouped under seven pillars (PI, II, III, IV, V, VI and VII) in the Vision 2025. Important subjects covered by the discipline of Development Studies include (relevant pillars of the Vision 2025 are shown against the subject.

-
7. Entrepreneurship and Development (P-III, P-V, P-VI)
 - Historical, Cultural and Institutional perspectives
 - Micro and macro enterprises management
 8. NGO Management (P-II)
 - Community Mobilization
 9. Globalization, Society, Economy and Development (P-II)
 - Globalization and Development
 - Competing in the Global Economy
 - Empowering Society
 10. Technology, Development and Local Assimilation (P-IV, P-V)
 11. Population and Development (P-II)
 - demographic dividends or demographic threats and disaster
 12. Equity and Sustainable Development (P-IV)
 - Sustainable Development Goals
 - Natural Resource Management
 - Environmental conservations
 - Climate Change
 - Disaster Management
 - Reflective Practice and Social Change
 13. Conflict, Security and Development (P-II)
 - Governance of Violent conflict and insecurity
 14. Public Policy (P-III)
 - Power, Politics and Policy Making Process
 - Policy Audit
 15. Development, post development and critical theory (P-III)
 16. Public accountability (P-III)
 17. Advocacy (P-II)
 18. Public Finance (P-III)
 - Local Government Finance
 - Local Government Audit
 19. Disasters Risk Management
 20. Survival and Resilience
 21. Disaster Risk Management
-

-
22. Social Research Methods
 23. Quantitative Methods
 24. Qualitative Methods
 25. Mix Methods

Engineering and Technology

1. Energy, Engineering and Technology
 - Electrical Engineering
 - Mechanical Engineering
 - Chemical Engineering
 - Mining Engineering
 - Materials
 - CleanTech, Nuclear Engineering and Energy Systems Engineering, Nanotechnology, Photovoltaic (PV) and Thin Film Technology
2. Interdisciplinary Areas Engineering, IT and Manufacturing Industry for China-Pakistan Economic Corridor and Development
 - Civil Engineering
 - Mining Engineering
 - Transportation Engineering
 - Mechanical Engineering
 - Petroleum & Gas Engineering
 - Automobile and Materials Engineering
 - ICT, Telecom and Computer Engineering and Advanced Design, Applied Sciences and Management, Entrepreneurship and Innovation
3. Oil and Gas Sector, IP Gas Pipeline and other projects
 - Petroleum and Gas Engineering
 - Chemical Engineering
 - IT, Materials and Manufacturing Engineering
 - Mechanical Engineering
 - Industrial Engineering and Automation
 - Product Design, Process Engineering
 - Telecom
4. Water Resource Management and Agriculture

-
- Civil Engineering
 - Water Resource Engineering
 - Agricultural Engineering
 - Biotechnology
 - Genetic Engineering
 - Chemical Engineering and Modeling and Simulation
 - Remote Sensing,
 - Water Management
5. Manufacturing and Innovation
- Industrial and Systems Engineering
 - Mechanical Engineering
 - Mechatronics Engineering
 - Lean and Modern Technologies
 - Automation
 - Materials Molecular Dynamics
 - Advanced Manufacturing
 - Nanotechnology
6. Environment and Climate Change (Glacial Melting – monitoring and modeling)
- Environmental Engineering
 - Public Policy
 - Civil Engineering
 - Modeling and Simulation
 - Water Resource Engineering and Management
7. Job Creation, Technology Commercialization, Start-ups, Small Businesses Enterprise
- Entrepreneurship
 - Incubation
 - Management
 - Leadership
 - Quality Management

Economics

Core Areas

-
1. Macro Economics
 2. Micro Economics
 3. Econometrics

Specialized Subjects

1. Development Economics
2. Monetary Economics
3. International Economics
4. Public Economics/ Public Finance
5. Labor Economics
6. Financial Economics

Policy Areas

1. Agriculture Economics
2. Economics of Water Resources
3. Energy Economics
4. Institutional Economics
5. Economics of Education
6. Industrial Economics

Earth, Atmospheric, and Planetary Sciences

1. Advanced Igneous Petrology
2. Analytical Techniques for Studying Environmental and Geologic Samples
3. Atmosphere, Ocean and Climate Dynamics
4. Atmospheric Chemistry
5. Atmospheric Physics and Chemistry
6. Atmospheric Radiation
7. Basics of Impact Cratering & Geological, Geophysical, Geochemical, Environmental Studies of Some Impact Craters of the Earth
8. Dynamics of Complex Systems: Biological and Environmental Coevolution Preceding the Cambrian Explosion
9. Environmental Earth Science
10. Field Geology I
11. Fluid Dynamics of the Atmosphere and Ocean

-
12. Geodynamics
 13. Global Climate Change: Economics, Science, and Policy
 14. Global Warming Science
 15. GPS: Where Are You?
 16. Introduction to Astronomy
 17. Introduction to Geology
 18. Introduction to Observational Physical Oceanography
 19. Introduction to Seismology
 20. Marine Chemistry
 21. Modeling Environmental Complexity
 22. Oral Communication in the Earth, Atmospheric, and Planetary Sciences
 23. Petrology
 24. Principles of the Global Positioning System
 25. Sedimentary Geology
 26. Structural Geology
 27. Structure of Earth Materials
 28. The Environment of the Earth's Surface
 29. The Solar System
 30. Thermodynamics for Geoscientists
 31. Trace-Element Geochemistry
 32. Turbulence in the Ocean and Atmosphere
 33. Mounting Hydrology, National Disaster Management
 34. Water Management
 35. Dimension stone geology

Mathematics

1. Abstract Algebra
2. Analysis
3. Applied Mathematics
4. Classical Mechanics
5. Complex Analysis
6. Computational Geometry
7. Computer Algebra / Cryptology

-
8. Differential Geometry
 9. Discrete Mathematics
 10. Dynamical Systems
 11. Fluid Dynamics
 12. Fluid Mechanics
 13. Industrial Mathematics
 14. Linear & Nonlinear Programming
 15. Linear and Matrix Algebra
 16. Mathematical Biology
 17. Modelling and Simulations
 18. Multivariable Calculus
 19. Numerical Analysis
 20. Optimization Theory
 21. Ordinary Differential Equations
 22. Partial Differential Equations
 23. Real Analysis
 24. Topology
 25. Trigonometry
 26. Financial mathematics
 27. Algebraic Geometry
 28. Program Languages for Mathematicians
 29. Vector & Tensor Analysis

Medical and Allied Health Sciences

1. Medicine
 - Family Medicine
 - Rural Medicine
 - Pediatrics
 - Internal Medicine
 - Women Health
 - Drug & Alcohol Abuse
 - Geriatrics
2. Healthcare Information Technology
3. Dental Medicine

-
4. Nursing & Midwifery
 - Clinical Nurse Leader
 - Nursing Administration
 - Nursing Informatics
 - Nurse Practitioner family & pediatric
 - Mental Health
 - Gerontology Acute & Primary Care
 5. Audiology
 6. Clinical Psychology
 7. Healthcare
 8. Management
 9. Occupational Therapy
 10. Nursing Anesthesia
 11. Pharmacy
 12. Physical Therapy
 13. Rehabilitation
 14. Social Work
 15. Speech Language
 16. Pathology
 17. Veterinary Medicine
 18. Counseling

New Trends

1. Renewable Energy
 2. New Materials
 3. Molecular & Cellular Sciences
 4. Technology & Innovation Management
 5. Nano Technology
 6. Medical Engineering & Medical Physics
 7. E-Governance & Management
 8. Environmental Eng Management
 9. Sc. Tech & Innovation Policy
 10. Cyber Security
 11. Robotics
-

-
12. Earth Sciences
 13. System Design & Development
 14. Artificial Intelligence
 15. Bioinformatics
 16. Forensic Sciences

Physical Sciences

1. Astrophysics
2. Atmospheric physics
3. Biomechanics
4. Computational physics
5. Cosmology
6. Electromagnetism
7. Geophysics
8. Materials physics
9. Medical physics
10. Optics
11. Optics and Wave Phenomena
12. Particle physics
13. Plasma physics
14. Polymer physics
15. Solid state physics
16. Theoretical physics
17. Nano Technology
18. Vacuum Physics
19. Space Sciences
20. Physics, Oceanography

Social Sciences

1. Social Transformation
2. International Relations
3. Education
4. Sociology
5. Psychology

-
6. Criminology
 7. Cultural Studies, Heritage and Tourism
 8. Public Policy and Governance
 9. Peace and Conflict Resolution
 10. World History
 11. Archeology and Cultural Tourism
 12. Religious Studies

Statistics

1. Algorithms for Inference
2. Inferential Statistics
3. Applied Spatial Statistics
4. Applied Statistics
5. Data analysis
6. Data and Models
7. Data Mining and Analysis
8. Data Mining and Machine Learning
9. Data Mining: Finding the Data and Models that Create Value
10. Decision Theory
11. Econometrics
12. Financial Models and Statistical Methods in Risk Management
13. Information theory
14. Introduction to Bayesian Analysis/Statistics
15. Multivariate Statistics
16. Nonparametric Statistics
17. Probability and Statistics
18. Reliability and Validity
19. Statistical Method in Economics
20. Stochastic Processes
21. Time Series Analysis
22. Sampling Analysis
23. Actuarial Sciences

Appendix C - Overview of Scholarship Programs

APLU compared the following programs:

- Brazil's Scientific Mobility Program (formerly Science without Borders)
- Republic of Kazakhstan's Bolashak Scholarship Program
- Saudi Arabia's King Abdullah Scholarship Program (KASP)
- Indonesia's Educational Endowment Fund Scholarships
- Vietnam's International Education Development Program (Project 911- VIED)
- USAID's Innovative Agricultural Research Initiative (iAGRI)
- USAID's Borlaug Higher Education Agricultural Research and Development (BHEARD) Program

The comparative data can be found here:

<https://docs.google.com/spreadsheets/d/1g7ScYd3F6X7zyDIB5CBRrqnHwJDb-8WfR2BoOnq0o1E/edit?usp=sharing>

Appendix D - List of Carnegie Classified Research 1 and Research 2 Universities

APLU recommends use of the [Carnegie Classification of Institutions of Higher Education](#) as the basis for selecting eligible universities and allow for the placement of scholars in Research 1 and Research 2 universities. This system provides a framework for classifying colleges and universities in the United States based on their research activity. Doctoral universities are assigned to one of three categories based on a measure of research activity.

A list of the institutions categorized as Research 1 and Research 2 can be found here:

https://docs.google.com/spreadsheets/d/1hu04YMi_NON2tnVQdQhgFMpKxqgamyOLvJSyePDbjvw/edit?usp=sharing

Appendix E - Living Costs at 10 US Universities for Doctoral Study

A survey was taken of eleven US universities regarding the costs of living for a year for a doctoral international student. These costs included room, board, books, health insurance and transportation expenses. No tuition or related fees were included in these costs. None of these costs included expenses for families who might accompany the student. Graduate school admission offices require documentation that students can pay these costs as a part of the graduate school application process.

The universities that were included in the survey were:

1. Arizona State University
2. Michigan State University
3. Mississippi State University
4. Ohio State University
5. Purdue University
6. New York University
7. Southern Illinois University
8. University of California at Davis
9. University of Illinois at Urbana Champaign
10. University of Utah
11. Wayne State University

The mean of these living costs from these 11 universities was \$20,250/student/year. The median of this data was \$18,700. The range of these data was from \$14,500 – \$33,874/year/student.

These data indicate that it would be important to have a flexible level of living expense allowance for Pakistan doctoral program students. Living costs are much higher in larger than in smaller cities, in general.

Appendix F - PhD Student Financial Support and Assistantships

The following data is from a sample of three US public universities on graduate assistantships. The three universities represent different regions of the country and institutional types. This data is intended to supplement the data provided in Section 5 (Option 3) on the prevalence of assistantships to support graduate education.

Mississippi State University

2016 Graduate Enrollments (by College)

College Name	Total Number of PhD students	Number receiving an assistantship	Percentage receiving assistantship
Bagley College of Engineering	344	175	51%
College of Ag. & Life Sciences	156	75	48%
College of Arts & Sciences	276	205	74%
College of Business	29	23	79%
College of Education	257	40	16%
College of Forest Resources	48	39	81%
College of Veterinary Medicine	44	30	68%
Total	1154	587	51%

Graduate research assistants receive 100% tuition/fee scholarships, and graduate teaching and service assistants receive 71% tuition/fee scholarships at MSU.

Rutgers

Rutgers has approximately 2,800 PhD students in total. On average, 1,800 of those students at any given time are fully supported. This is 64% of the total number of PhD students. They receive a full stipend/salary, full remission of tuition, full remission of fees, and health insurance.

University of Illinois

Summary for Illinois:

- % of PhD students with an assistantship fully covering tuition and fees:
 - 65%: Ag, Consumer and Environmental Science; Engineering; Science; Media
 - Less than 65%: Applied Life Sciences; Education, Fine and Applied Arts; Vet Medicine
 - Less than 40%: Business; Information Science; Labor and Industrial Relations; Social Work

Data by campus and by colleges at Illinois

University of Illinois Campus wide

- 73% of PhD students receive financial support
- Tuition paid by
 - Student – 42%
 - Waived by unit assistantship – 29%
 - Waived by Grad College – 7%
 - Paid by research sponsor – 14%
 - Paid by other than students and above categories – 8%

U of I College of Ag, Consumer and Environmental Science

- 91% of PhD students receive financial support
- Tuition paid by
 - Student – 35%
 - Waived by unit – assistantship – 31%
 - Waived by Grad College – Fellowship – 13%
 - Paid by research sponsor 11%
 - Paid by other than students and above categories – 10%

U of I College of Applied Life Sciences

- 78% of PhD students receive financial support
- Tuition paid by
 - Students – 50%
 - Waived by Unit – assistantships – 30%
 - Paid by research sponsor – 6%

-
- o Paid by other units – 9%
 - o Paid by other than students and above categories – 5%

U of I College of Business

- 95% of PhD students receive financial support
- Tuition paid by
 - o Student - 85%
 - o Waived by unit assistantship – 11%
 - o Paid by other than student and unit assistantship – 4%

U of I College of Education

- 60% of students receive financial assistance
- Tuition paid by
 - o Students - 54%
 - o Waived by unit assistantship – 16%
 - o Waived by Grad College – Fellowship – 11%
 - o Waived by other unit – 13%
 - o Paid by other than student and above categories – 6%

U of I College of Engineering

- 95% of PhD students receive financial assistance
- Tuition paid by
 - o Students – 31%
 - o Paid by research sponsor – 30%
 - o Paid by unit assistantship – 30%
 - o Waived by Grad College – Fellowship – 3%
 - o Paid by other than students and above categories – 6%

U of I College of Fine and Applied Arts

- 51% of PhD students receive financial assistance
- Tuition paid by
 - o Students – 39%
 - o Waived by Unit assistantship – 37%
 - o Waived by Unit stand alone? – 10%
 - o Waived by Grad College – Fellowship – 8%
 - o Paid by other than student and above categories – 6%

U of I College of Liberal Arts and Sciences

-
- 97% of students receive financial assistance
 - Tuition paid by
 - o Student – 26%
 - o Waived by Unit assistantships – 43%
 - o Waived by Grad College – Fellowship – 12%
 - o Paid by research sponsor – 12%
 - o Paid by other than student and above categories – 7%

U of I College of Media

- 81% of PhD students receive financial assistance
- Tuition paid by
 - o Waived by Unit assistantships – 37%
 - o Students – 34%
 - o Waived by Grad College – 18%
 - o Paid by other than students and above categories – 11%

U of I College of Veterinary Medicine

- 4% of PhD students receive financial assistance
- Tuition paid by
 - o Waived by Unit Assistantships – 40%
 - o Student – 31%
 - o Paid by research sponsor – 11%
 - o Waived by Grad College Fellowship – 7%
 - o Paid by other than students and above categories – 11%

U of I School of Information Sciences

- 88% of PhD students receive financial assistance
- Tuition paid by
 - o Students - 61%
 - o Waived by other units – 19%
 - o Waived by Unit Assistantships – 11%
 - o Paid by other than students and above categories – 9%

U of I School of Labor and Employment Relations

- 90% of PhD students receive financial support
- Tuition Paid by
 - o Students - 89%

-
- o Waived by the Grad College – fellowship – 5%
 - o Waived by Unit assistantship – 4%
 - o Paid by other than students and above categories – 2%

U of I School of Social Work

- 60% of PhD students receive financial support
- Tuition paid by
 - o Students - 77%
 - o Waived by Unit standalone – 7%
 - o Waived by Unit Assistantship – 6%
 - o Waived by other unit – 5%
 - o Paid by other than students and above categories – 5%

Appendix G - Budget Scenarios

The following three budget scenarios are built using the HEC's budget formats. They are all built based on the following assumptions:

- The program budget is fixed at the original capital cost of 18.8 million RS over the 96 month period.
- The projected enrollment target for the pilot phase is 868 students.
- All contingency costs in the Summary of Capital Costs have been rolled into the program development costs line item. If allowable, these program funds could be utilized in support of other recommendations in this analysis.
- The living allowance of \$1475 per month has been increased to \$1500 per month in scenarios one and two and \$1600 per month in scenario three.
- The cost of living allowance is a twelve month allowance in each scenario.
- PhD Talent Farming costs remain fixed in each scenario. While we recommend additional academic preparation, which will increase the Talent Farming costs, we assumed these additional costs could be covered by the program development resources.
- Project management costs have been adjusted in each scenario to reflect the appropriate level of staffing.
- Each scenario has a Summary of Capital Costs outlining the percentage of the budget dedicated to scholarship, talent farming, operational costs, and program development.

Details on each scenario are provided in Section 6.

Scenario 1 - No Tuition

<https://docs.google.com/spreadsheets/d/1rgc5Iphzr1YZXAhbzC6U9ISYO4cfr0DL2xS0kG2E5r8/edit?usp=sharing>

Scenario 2 - Low-Cost Tuition

https://docs.google.com/spreadsheets/d/1C4fNhGMKFXzQ5wRUyzBtnN8RjunAD_T00VKqLmM2p-U/edit?usp=sharing

Scenario 3 - High-Cost Tuition

<https://docs.google.com/spreadsheets/d/194niXsKwSwKSzJsPNenDSIGTwTvbHqqob5kohyLXu8c/edit?usp=sharing>